















INTERNATIONAL FOOD INFORMATION SERVICE

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FAB 51

MEAT CANNING

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MEAT CANNING

VOLUME 6

FOOD ANNOTATED BIBLIOGRAPHY No. 51

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## INTRODUCTION

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H. BROOKES

ASSISTANT EDITOR







## 1

[Distribution of vitamins B<sub>1</sub>, B<sub>2</sub>, and PP in canned meats.]

Cantoni, C.; Minoccheri, F.

*Industrie Alimentari* 12 (9) 107-108 (1973) [7 ref. It] [Istituto di Ispezione Alimenti di Animale, Univ. di Milano, Italy]

10 samples of canned meat (veal, pork, chicken, beef) from 3 different sources were analysed for contents of thiamine, riboflavin and nicotinic acid, the meat and the gelatin being analysed separately to determine the distribution of the vitamins. Mean values for the meat and gelatin, respectively, were (mg/100 g): thiamine, 0.121 and 0.034; riboflavin, 0.139 and 0.038; and nicotinic acid, 3.81 and 0.78. On the basis of data reported in the literature for fresh meat loss of the 3 vitamins in the meat after sterilization was 19.3, 7.3 and 22.2% respectively; however, taking the meat + gelatin, the differences were virtually eliminated. HBr

## 2

[Contents of amino acids in raw and sterilized beef and in other foods.]

Cipolla, M.; Cantoni, C.; Benatti, R.

*Industrie Alimentari* 12 (9) 119-126 (1973) [3 ref. It, en] [Istituto di Ispezione Alimenti di Animale, Univ. di Milano, Italy]

The amino acid contents of a wide range of canned meats and meat products (including luncheon meat, corned beef, ground meat, ground bone, animal gelatin, tripe, broth) and of a number of other products (caseinate, yeast extract, eggs, soya granules) are tabulated. HBr

## 3

Sliced canned ham.

Stewart, M. Z. (Dubuque Packing Co.)

*United States Patent* 3 753 741 (1973) [En]

Canned hams or pork shoulders are prepared in a 2-stage cooking process in which the unsliced meat is first seered in a container, cooked, chilled, removed from the container, sliced, and resealed for a 2nd cooking process along with minor amounts of honey and meat juices. IFT

## 4

[Temperature control in canned products.]

Temperaturkontrolle im Konservenbehältnis.

Hornung, H.

*Fleischwirtschaft* 53 (9) 1185-1190 (1973) [De] [5509 Thalfang, Bezirk Trier, Charlottenhöhe 3, Federal Republic of Germany]

The control of sterilization temp. of canned meat products is discussed. The method of choice uses Fe-constantan or Cu-constantan thermocouples of 0.5 mm diam. Various types of instruments are described including some for vacuum packed cans. Methods of operation and sources of error are briefly outlined. RM

## 5

[Manufacture of canned ham. High quality requirements.] Herstellung von Dosenschinken. Hohe Qualitäts-Anforderungen.

Ingenpass, P.

*Fleischwirtschaft* 53 (7) 914-917 (1973) [9 ref. De] [4154 Tönisvorst 1, Schellthofer Strasse 57, Federal Republic of Germany]

Requirements for the manufacture of high-quality canned ham are described including: raw material; production hygiene; curing (intravenous or intramuscular injection); multipoint surface flaming and removal of surface curing brine, followed by storage at 8°C and 80% RH for 3-6 days; tumbling; vacuum tumbling; the Drainkarn process of intensive kneading; composition of injection brine and curing brine; smoking; canning; preserving; cooking; autoclaving (pasteurizing); sterilizing; formation of jelly; and causes of discoloration. Methods of quality evaluation are based on: "added substance" in USA, defined as water + salt - (protein × 3.83); "meat content" in the UK, defined as content of lean meat + fat with lean meat as  $N \times 100/3.45$ ; "moisture content of defatted product" in France, defined as Water content × 100/100 - fat; and the "Federzahl" in the Netherlands defined as water content/100 - (water + fat; ash contents). Addition of phosphates is allowed, limited to 0.5% max. in USA, UK and Netherlands. RM

## 6

[Method for packaging meat products to be sterilized in cans e.g. hams and shoulders.]

Michels, P. W. (Homburg NV)

*Netherlands Patent Application* 7 200 669 (1973) [NI]

Cooked hams or shoulders, which are packaged preferably in rectangular cans in which they are sterilized, are provided with an inner wrapping consisting of a plastics bag which, in order to facilitate easy removal of the contents without loss of, e.g. gelled meat juices, has incisions of  $\geq 3$  cm length at its opening. The meat product is removed by opening the can at both ends, folding the flaps of the plastics bag formed by the incisions around the front rim of the can and securing them on the outer surface of the can, and removing the product and bag by pressure from the rear end of the can, in which process the bag is turned inside out. W&Co

## 7

[Estimation of nutritive value of some canned meat/vegetable products.]

Kmiec, J.; Chudy, J.; Rutkowski, A.

*Zeszyty Naukowe Akademii Rolniczo-Technicznej w Olsztynie, Technologia Żywności* No. 2, 29-38 (1973) [6 ref. Pl, ru, en] [Inst. Inżynierii i Biotech. Żywności, Akad. Rolniczo-Tech., Olsztyn, Poland]

Bigos (sauerkraut, sausage and pork stew), cabbage leaves with pork stuffing in tomato sauce, peas and pork in tomato sauce, and beef goulash with macaroni in 0.5-kg cans manufactured in a







Lodz (Poland) canning factory in May 1962 had respectively the following composition (in DM, except for moisture): moisture, 76.0, 79.5, 74.8, and 78.2%; fat, 52.1, 50.3, 26.6 and 9.5%; protein (N  $\times$  6.25), 28.7, 26.8, 37.3 and 30.5%; carbohydrate, 11.3, 14.1, 29.0 and 53.7%; ash, 7.9, 8.8, 7.1 and 6.4%; and NaCl, 7.1, 8.3, 6.7 and 6.0%. In vitro protein digestibility values were 83.0, 87.8, 87.4 and 89.1 respectively. Results of tests on rats are also presented. SKK

## 8

[Manufacture of canned pork.]

Barmash, A.

*Myasnaya Industriya SSSR* 43 (10) 31-34 (1972)

[Ru]

Processing methods and recipes are given for manufacture of a range of canned pork products using all parts of the pig carcass. STI

## 9

[Canned fat pork with vegetables.]

Marchuk, L.; Shevchuk, A.; Sokolovskaya, Zh.

*Myasnaya Industriya SSSR* 44 (1) 20-21 (1973)

[Ru]

Production of canned fat pork with vegetables and groats is described, with reference to recipes used, and sterilization temp. and time. STI

## 10

[New production process for canned ham.]

Kurko, V.; Kivisild, L.

*Myasnaya Industriya SSSR* 44 (1) 29-30 (1973)

[Ru]

Deboned, trimmed pork pieces (wt. approx. 300 g) are mixed with salt, and ripened for 2 days at 4-6°C in polyethylene vats (capacity 15-20 l.); prolongation of the ageing period up to 6 days improves the quality of the product. The cured meat may easily be moulded and filled into cans; pasteurization is by a 2-stage process. STI

## 11

Hannibal, Mo.: canning on the threshold of a new era.

Ziembra, J. V.

*Food Engineering* 45 (12) 77-80 (1973) [En]

[100 S. Wacker Drive, Chicago, Illinois 60606, USA]

Preparation of brine and pickle for hams, injection of pickle into hams, curing, retort cooking, preparation of ham emulsion and filling of cans with the ham spread at Underwood's factory at Hannibal, Missouri, where emphasis is placed on quality control, are described. PG

## 12

[Sterilized meat products.]

Frouin, A.

*Industries Alimentaires et Agricoles* 89 (5) 603-611 (1972) [30 ref. Fr, de, en]

Economic changes in the production of canned meat products are discussed; statistics for France for each yr from 1965 to 1970 show little increase in production of pure or nearly pure meat products (corned beef, pates, meat pastes) but large increases for meat with vegetables and other convenience foods. The influence of thermal sterilization on biochemical changes in meat, destruction of bacteria, and flavour and texture characteristics is discussed, and methods are given for calculating an optimum treatment. Basic methods have been almost unchanged for many years; technical improvements have been mainly mechanical, particularly in continuous sterilization (hydrostatic autoclaves, flame sterilizers, hydroflow systems). The UHT method, combined with aseptic packaging, may find application but it is pointed out that some undesirable enzymes may not be inactivated. The non-homogeneous nature of meat still prevents successful application of new methods of heating (dielectric or microwave), but radiation sterilization may ultimately become universal for most foods. The traditional metal can now presents few unsolved problems, but changes could result from successful introduction of Al cans with tear opening for sterilized meat products. ELC

## 13

Use of creamy substitute permits easy retorting.

Anon.

*Food Processing* 34 (11) 24 (1973) [En]

The development of a selection of canned meats in sauce is discussed with special reference to the preparation of a sauce to accompany poultry dishes. The selection of a liquid cream substitute that does not contain reducing sugars permits a rich, white smooth sauce to be produced. Use of a specialized starch system helps to hold retort time down, while thickening the sauce without making it pasty. The sauce tolerates steam-table heating, baking, and refrigeration temp. well, and supplies rich flavour without overpowering the delicate flavour of turkey or chicken. AA

## 14

[Methods of determining the meat content of canned meats.]

Bisoglio, G.; Cipolla, M.; Cantoni, C.

*Industria Alimentari* 12 (12) 59-65 (1973) [3 ref.

It, en]

The wt. of the can, meat and gelatine in 670 samples of canned meat were determined by different techniques in general laboratory use, including that used by the Italian customs laboratory. All the methods gave rise to some error, that of the customs giving a 5-10% deficiency in the meat content. HBR





## 15

**Processed meats. [Book]**

Kramlich, W. E.; Pearson, A. M.; Tauber, F. W. vii±348pp. ISBN 0 87055 (1973) [many ref. En] Westport, Connecticut, USA, AVI Publishing Co. Inc. Price \$20 (USA) \$21 (Foreign) [John Morrel & Co., Chicago, Illinois, USA]

This book is intended as a text and reference work for advanced undergraduate and graduate studies in meat processing. It is hoped that it will prove useful for industrial and government personnel engaged in that field. The following chapters are included: Introduction to meat processing (pp. 1-12, 7 ref.); Composition and nutritive value of raw materials and processed meats (pp. 13-39, 28 ref.); Curing (pp. 40-60, 11 ref.); Smoking (pp. 61-77, 9 ref.); Meat cookery and cooked meat products (pp. 78-107, 21 ref.); Raw materials (pp. 108-121, 13 ref.); Sausages (pp. 122-152, 23 ref.); Least-cost formulation and preblending of sausage (pp. 153-181, 39 ref.); Sausage formulations (pp. 182-220); Smoked meats (pp. 221-241, 23 ref.); Canned meats (pp. 242-256, 14 ref.); Canned meat formulations (pp. 257-279); Analytical methodology (pp. 280-311, 4 ref.); Other methods of processing (pp. 312-330, 18 ref.); and Processed meat deterioration (pp. 331-341, 16 ref.). VJG

## 16

**[Can for foods and beverages, particularly meat and sausage products, with a sealed inner film made of plastics.]**

Liesenfeld, E.

**German Federal Republic Patent Application**

2 148 509 (1973) [De]

The can, particularly for meat and sausage products, has a resilient, sealed, inner plastics film having max. resistance to fats and oils, and min. gas permeability. The film is preferably made of polyamide containing approx. 20% protein, which allows it to be stretched in the desired direction while the can is filled so that the air can be displaced. W&Co

## 17

**[Colorimetric method with morin for determination of tin content of foods.]**

Fitak, B.; Zaklika, T.

**Roczniki Panstwowego Zakladu Higieny 24 (5)**

627-633 (1973) [9 ref. Pl, en] [Zaklad Bromatologii Inst. Biofarmacji Akad. Medycznej, Warsaw, Poland]

The colorimetric test with morin for determination of the Sn content in alloys [Chem. listy (1954) 48, 1694] was adapted for determination of Sn in foods. A modified analytical procedure is described, in which the acidity of the reacting medium is reduced, and the distilled water used to bring the colorimetric solution to the desired vol. is replaced with ethanol. A 10N NaOH solution is used to neutralize the solution of the mineralized sample of food. The method is suitable

not only for determination of tetravalent tin but also for bivalent tin. The recovery rate of the colorimetric method with morin is not significantly different from the recovery of Sn using a modified iodometric method. In tests on tomato juice, canned beef, meat and vegetable preserves and canned fish, the mean recovery rate of the colorimetric method with morin was 98.93%. The new method is accurate, simple and rapid. HBr

## 18

**[Balance sheet of the USSR meat industry in 1972.]**

Esin, N.

**Myasnaya Industriya SSSR 44 (3) 6-7 (1973) [Ru]**

In 1972, the USSR meat industry produced 7 934 000 t meat, 319 200 t poultry, 2 441 000 t smoked meat products, 334 400 t edible lard and suet, and 143 million cans of meat (average wt. 350-375 g). Compared with 1971, gross production increased by 5.5%. STI

## 19

**[Improving the quality of canned meat at vegetables and prolonging their keeping quality during storage.]**

Kripak, N.; Neeshkhlebov, A.; Martynova, G.; Khomutov, B.; Kastornykh, M.; Lovachev, L.; Fastovskii, I.; Chesnokov, P.

**Myasnaya Industriya SSSR 44 (3) 18-21 (1973)**

[4 ref. Ru]

Addition of juniper or black pepper extract in combination with pyrophosphate and sodium glutamate and citric acid to canned meat and vegetables improved the organoleptic properties of the product as well as the keeping quality of the contents during storage. STI

## 20

**[Biochemical evaluation of state of hygiene and quality of canned meat products in relation to freshness of meat used.]**

Gheorghe, V.; Manea, M.

**Industria Alimentara 24 (4) 199-202 (1973) [10 ref. Ro, en, fr, de, ru] [Inst. di Igienea si Sanatate Publica, Bucharest, Rumania]**

During 10 months, the quality of 80 batches of pig meat and beef was studied at various stages of preparation for own-juice canning and after sterilization in 300-g cans at 120°C for 15/60/15 min. Mean values and ranges are tabulated for contents of easily hydrolysable N (as NH<sub>3</sub>), alkaline substances, amino N and extract acidity in fresh meat and in meat held at 5-7°C for 4-5 days until appearance of first organoleptic changes, as well as for corresponding canned meats. Biochemical criteria are proposed on this basis for differentiation between freshness (F) and relative freshness (R) of raw meat on the basis of canned meat characteristics. Values for canned meat with corresponding raw meat assessment in parentheses were: easily hydrolysable N (as mg NH<sub>3</sub>/100 g), pig meat ≤50.0 (F), and 51.0-55.0 (R), beef ≤57 (F) and 58.0-60.0 (R); alkaline substances (ml 0.02 N





HCL/10 g), pig meat  $\leq 2.6$  (F) and 2.8-4.1 (R), beef  $\leq 2.0$  (F) and 2.1-2.3 (R); and amino N (mg/100 g), pig meat  $\leq 90$  (F) and 95-110 (R), beef  $\leq 80$  (F) and 81-110 (R). SKK

## 21

[Some hygienic/chemical problems in the production of canned meat.] Einige hygienisch-chemische Probleme der Fleischkonservenherstellung in Blechdosen. [Review]  
Pezacki, W.

*Wiener Tierärztliche Monatsschrift* 61 (2) 51-57 (1974) [9 ref. De, en] [Akad. Rolnicza, Poznan, Poland]

The effects of various factors (including ripening of the meat, heat treatment conditions, storage time and temp., meat curing agents, gelatin, polyphosphates and ascorbic acid) on internal corrosion of cans and changes in the amino N,  $\text{NH}_4$ ,  $\text{H}_2\text{S}$ , Sn and Fe content of canned meat are discussed. Measures for reduction of the rate of chemical changes in canned meat are suggested, including lining the cans with inert plastics, and use of microwave heating to eliminate overheating of the outer layers of the product. AJDW

## 22

The aroma of canned beef: processing and formulation aspects.

Persson, T.; Sydow, E. von

*Journal of Food Science* 39 (2) 406-413 (1974) [18 ref. En] [Swedish Inst. for Food Preservation Res. (SIK), Fack, S-400 21 Göteborg 16, Sweden]

Influence of processing techniques and formulations on chemical and sensory aroma properties has been studied with the purpose of finding ways to improve flavour of canned meat. HTST-sterilization, 'aseptic' canning and sterilization in various packaging materials including flexible pouches have been investigated. It was found that 'aseptic' canning and, especially, HTST-sterilization had a pronounced positive effect on aroma, in the latter case for samples packed in thin layers (flexible pouches). It was shown that addition of, e.g. fumarate or maleate in small amounts (0.06-0.15%) before sterilization decreased concn. of  $\text{H}_2\text{S}$  and mercaptans, and addition of certain amino acids, e.g. arginine, decreased the concn. of the aldehydes. Both types of ingredient resulted in an improved aroma. Storage changes have also been investigated. It was found that there was a tendency towards a more accelerated change in flexible pouches compared with rigid cans. [See FSTA (1973) 5 11S1272 for previous part.] IFT

## 23

[Canned meat, poultry and fish: sampling and testing.]

Bulgaria, Komitet po Kachestvoto, Standartizatsiyata i Metrologiyata  
*Bulgarian Standard* BDS 1035-72 9pp. (1972) [Bg]

This standard replaces BDS 1035-52 and covers regulations on sampling and methods of testing of canned sterilized meat, poultry and fish. Stipulated requirements on sampling; packaging, labelling and official documentation of samples; and of organoleptic, physical, chemical and microbiological methods of testing are presented. SKK

## 24

[A new Danish method: safer heat treatment of canned meat.] Eine neue Methode in Dänemark mehr Sicherheit für ausreichende Erhitzung von Fleisch-Konserven.

Jul, M.

*Fleischwirtschaft* 54 (4) 704 (1974) [De]

A simple control method for adequate sterilisation of canned meat was developed: the lids of all cans are marked with a heat sensitive paint during can manufacture. The paint is resistant to dry heat but changes colour due to moist heat during autoclaving. The colour change is complete only after  $\geq 4$  h at  $162^\circ\text{F}$  ( $72^\circ\text{C}$ ) thus assuring detection of any insufficient treatment. RM

## 25

Armour opens new canned meat facility.

Anon.

*Food Production/Management* 96 (11) 28 (1974) [En]

Armour-Dial's new canned meats plant at Fort Madison, Iowa, is briefly described. It has the capacity to turn out 400 million cans of Armour Star convenience meats each year. The facility produces >30 varieties and pack sizes of convenience meats including Vienna sausage, beef stew, Chili, chopped ham, chopped beef, potted meats, corned beef hash, devilled ham and Chili Dogs. AA

## 26

[Preserved meat products in aluminium cans.]

Marchenko, A.; Neeshkhlebov, A.; Vorob'ev, V.  
*Myasnaya Industriya SSSR* 44 (9) 28-30 (1973) [5 ref. Ru] [Kazakhskii Filial VNIIMPa, USSR]

Details are given of studies on the interaction of lacquered seamless Al cans with preserved meat products, with special reference to effects on the inner surface of the can, and the organoleptic properties of the meat products. STI

## 27

[Study of corrosion processes. Tests on selection of model medium simulating canned meat conditions.] Chomiak, D.

*Opakowanie* 19 (2) 20-22 (1973) [10 ref. Pl, ru, en]

Sn/Fe electrodes made respectively of pure Sn and tin-plate with Sn removed by acid pickling, or tin-plate, or tin-plate treated as described by Carter & Butler [Corrosion (1961) 17, 2] were used in these tests. The electrodes (of  $25\text{ cm}^2$  surface area, placed parallel at 1 cm distance in glass vessels at







72  $\pm$  0.5°C) were immersed in model media of (i) 1% aqueous solution of sodium thioglycolate (pH 6.22); (ii) 10 g NaCl, 10 g gelatin, 2 g Na<sub>2</sub>S 20 ml acetic acid in 1 l. distilled water (pH 6.9); (iii) 10 g NaCl, 10 g gelatin, 2 g cysteine in 1 l. distilled water (pH 5.3); or (iv) 'broth' from 1 kg minced ham pasteurized 24 h after slaughter in 2 l. of 3% NaCl, and filtered through thick gauze (pH 6.25). Electrode potentials and quantities of Sn and Fe removed from the electrodes were determined for 6 h at 2-h intervals. It is concluded from tabulated and graphically presented results that the corrosive effects were in the order (i) > (iii) > (ii) > (iv). None of the solutions tested was considered suitable as substitute for contents of meat cans, but it is pointed out that (iv) (nearest to them in nature) had the least corrosive effect. Because of its strong corrosive properties, (i) is suggested for assessment of tin-plate porosity. SKK

## 28

**Calcium of a thermal process for the sterilisation of canned beef.**

Cohen, J. S.

*Transactions of the ASAE* 17 (1) 52-55 (1974) [8 ref. En] [Irradiated Food Products Div., Food Lab., US Army Natick Lab., Massachusetts, USA]

A probabilistic method was used to determine the thermal processing time required for beef in 404  $\times$  202 size cans, to achieve selected microbial lethality (F values). Studies were conducted on raw beef (13.0% fat) and enzyme-inactivated beef (8.0, 16.0 and 16.17% fat). Values are given for times required to reach various F values at selected probability levels. The probabilistic method gave information on the distribution of lethality throughout each batch of cans, and was preferred to the 'slowest heating can' method. RM

## 29

**An introduction to synthetic meat flavours.**

May, C. G.

*Food Trade Review* 44 (1) 7, 9-10, 12-14 (1974) [24 ref. En]

A brief description is given of how research into beef flavour led to the development of the first commercially used imitation meat flavours. Flavour precursors in raw beef and flavour volatiles from cooked beef are considered. Production of improved beef flavours by acid hydrolysis of various proteins is described. Amino acid analysis of protein hydrolysates used in meat flavours (wheat gluten, pig bristle, hoof and horn, and deflavoured cod fish) is given with an analysis of lean beef hydrolysate for comparison. The application of meat flavour to a convenience food (a dried soup), novel proteins or simulated meat products and canned foods is considered. The manner in which future work in this field is likely to develop is considered. VJG

## 30

**[Microbiology of packaging meat and meat products.] Mikrobiologie der Verpackung von Fleisch und Fleischwaren. [Lecture]**

Leistner, L.

*Fleischwirtschaft* 54 (6) 1036-1039 (1974) [De] [Bundesanstalt für Fleischforschung, 8650 Kulmbach, Blaich 4, Federal Republic of Germany]

Microbiological aspects of packaging meat and meat products in films, casings, glass or cans are discussed for meat cuts (fresh or frozen), meat in maturation bags, fresh meat products, matured meat products, and canned meat products. The effects of packaging, product, preservation, and physical methods of preservation, on spoilage organisms, meat poisoning organisms and maturation organisms are tabulated. RM

## 31

**[The effect of textured vegetable proteins on the inner surface of tinned sheet metal cans during thermal processing.]**

Jakasa, K.; Dordevic, M.

*Tehnologija Mesa* 14 (11) 363-365 (1973) [5 ref. Sh. en] [Jugoslavenski Inst. za Tehnologiju Mesa, Belgrade, Yugoslavia]

The corrosive effect of textured vegetable proteins added to meat products (20%) thermally processed in tinned sheet metal cans was either identical to or less aggressive than that of the meat product without any addition. STI

## 32

**[Production and heating problems of calorie-reduced canned meats.] Herstellung und Erhitzungsprobleme bei kalorienverminderten Fleischkonserven.**

Wirth, F.

*Fleischwirtschaft* 54 (5) 888-890, 893-894 (1974) [De] [Bundesanstalt für Fleischforschung, 8650 Kulmbach, Blaich 4, Federal Republic of Germany]

Technological problems of producing calorie-reduced (i.e. fat-reduced) canned meats including canned Brühwurst (Lyoner, Jagdwurst), Brühwurst with added poultry meat, small Frankfurters, liver sausage, blood sausage and brawn are discussed. The problems include water-binding and altered flavour. Some changes in technology are proposed for each type of product. The technological limits for reducing fat content are: for Brühwurst, reduction to 10-15%, allowing calorie reduction from the normal 200-320 to 140-200 kcal/100 g; for liver sausage, reduction to 15% (coarse)-20% (fine), allowing reduction from 300-400 to 200-250 kcal/100 g; for blood sausage and brawn, no limit on fat reduction, allowing reduction of calories from 200-500 to 140-180 kcal/100 g for blood sausage, from 150-300 to 90-140 kcal/100 g for low-fat brawn. RM





## 33

[The effect of processing on the organoleptic properties of prepared foods.] Der Einfluss der Herstellungstechnologie auf die sensorischen Eigenschaften von Fertiggerichten.  
Höll, J. C.; Reichert, J. E.  
*Fleischerei* 24 (10) 25-27 (1973) [De, en, fr]  
[Konserveninstitut Neumünster (KIN), 2350 Neumünster, Kieler Strasse 204, Federal Republic of Germany]

Various aspects of the manufacture of canned meat-based prepared meals are discussed including: use of emulsifiers and prevention of fat separation of sauces; use of spice and sterile spices; in can cooking; products manufactured from raw ingredients; use of rotary sterilization for improvement of the quality of canned products; and special problems in the manufacture of canned roast meat, meat grills in sauce, and rice and pasta-based products.

AJDW

## 34

[Effect of processing on the organoleptic properties of prepared foods.] Der Einfluss der Herstellungstechnologie auf die sensorischen Eigenschaften von Fertiggerichten und Fleischkonserven.

Höll, J. C.

*Fleischerei* 25 (2) 9-10 (1974) [De, en, fr]

Details are given of recipes, processing methods and canning conditions for manufacture of canned Königsberger meat balls in caper sauce, sauerbraten in sauce, and heart and liver ragout. Manufacture of canned convenience foods is briefly discussed, with reference to selection of recipes and process conditions to give the required product characteristics and quality. [See also preceding abstr.] AJDW

## 35

[Heat inactivation of lipase and other carboxyl ester hydrolases in high-fat canned products.] Über die Hitzeinaktivierung der Lipase und anderer Carboxylester-Hydrolasen in fettreichen Vollkonserven.

Hottenroth, B.

*Fleischwirtschaft* 54 (6) 1071-1074, 1077 (1974) [36 ref. De, en, fr] [Inst. für Lebensmitteltech. & Verpackung, 8000 Munich, Federal Republic of Germany]

The possible protective action of fat on endogenous lipase and other carboxyl esterases during sterilization and resulting deterioration of high-fat meat products during storage was investigated. Model experiments with pancreatic lipase showed that in aqueous solution heating at 65°C reduced activity to approx. 2.8% in 10 min, approx. 1.5% in 30 min and approx. 1.2% in 60 min. At 70°C, 90% of activity was destroyed in 0.6 sec. Z-value (increase in temp. necessary to reduce time

for a given % inactivation to one tenth) of water-soluble lipase preparation was 3.5 (cf. 5.5 for milk lipase) [Journal of Dairy Science (1948) 31 881]. Dry lipase powder retained 64% activity after 1 h and 58% after 2 h at 110°C. Corresponding values for an oil suspension were 62 and 46% respectively. No carboxyl ester hydrolase or lipase activity was found in a large number of commercial canned meat products (freshly canned and after long storage). Tests with laboratory canned lean pork and lard showed complete inactivation after 55 min. heating at 80°C for lean meat, and at 100°C for lard. Sorption isotherms and histochemical examination indicated that lard is a poor substrate for cytoplasmic enzymes can not survive usual conditions of sterilization. RM

## 36

The aroma of canned beef: application of regression models relating sensory and chemical data.

Persson, T.; Sydow, E. von

*Journal of Food Science* 39 (3) 537-541 (1974) [17 ref. En] [Swedish Inst. for Food Preservation Res. (SIK), Fack, S-400 21 Göteborg 16, Sweden]

The purpose of this investigation was to determine general relations between instrumental and sensory aroma data from a reference material consisting of a large set of different types of beef samples analysed during several yr. Relations obtained in this way were tested on independent 'unknown' samples. Different models were used, basically derived from Stevens' law and formulated in analogy with models used in other psychophysical contexts. From the reference material a great number of highly significant relations (several with a correlation coeff. <0.90) were obtained for the various odour notes used. Several of these seem to be examples of causative relations. When predicting sensory properties of unknown samples almost all the relations obtained with high correlation coeff. worked very well. These properties could be predicted by the gas chromatographic technique with the same accuracy as when the panel assessed the samples. Therefore, by applying the models in a proper way, the panel service in routine analyses may be supplemented or refined by using gas chromatography. These methods may, of course, also be used in product and process development work. [See also FSTA (1974) 6 7S922.] IFT

## 37

[Effect of nitrate, nitrite and ascorbic acid on sulphhydryl groups in canned cured meat.] Einfluss von Nitrat, Nitrit und Ascorbinsäure auf den Gehalt an Sulfhydrylgruppen in Pökelfleischkonserven.

Susic, M.; Hofmann, K.; Manojlovic, D.; Nikolic, G.

*Fleischwirtschaft* 54 (6) 1081-1083 (1974) [19 ref. De, en] [Jugoslavisches Inst. für Lebensmitteltech. Novi Sad, Yugoslavia]





The effects of  $\text{NO}_2^-$ ,  $\text{NO}_3^-$ , ascorbic acid and storage on the thiol content of 60 samples of canned meat products (i) pasteurized at  $76^\circ\text{C}$ , and (ii) 72 samples sterilized at  $100\text{--}110^\circ\text{C}$ , were studied. An inverse relationship was found between  $\text{NO}_2^-$  and thiol content in both types of product. Thiol content ( $\text{mol}/10^5 \text{ g protein}$ ) of 3 kinds of meat was 6.2–10.3 (mean for all products 6.6–9) highest concn. in samples containing 7 n  $\text{NaNO}_2/100 \text{ g}$ , and lowest concn. in samples with 35  $\text{mg}/100 \text{ g}$ ; corresponding figures for (ii) were 4.0–7.4 (mean 4.5–6.9).  $\text{NO}_3^-$ , ascorbic acid and variation in heating time had no effect. During storage, thiol content fell steadily in pasteurized products to 6.2–9.4  $\text{mol}/10^5 \text{ g protein}$  after 6 months. In sterilized products, a slight rise was observed between 6 and 12 months storage, probably due to interference of other compounds and a subsequent fall to 4.7–6.8  $\text{mol}/10^5 \text{ g}$  after 24 months of storage. RM

### 38

#### Inhibition of spores of *Clostridium* spp. by sodium nitrite.

Roberts, T. A.; Smart, J. L.

*Journal of Applied Bacteriology* 37 (2) 261–264 (1974) [7 ref. En] [Meat Res. Inst., Langford, Bristol, BS18 7DY, UK]

In an attempt to establish the reasons for microbiological stability in canned cured meat products, a study was made of the inhibition of *Clostridium botulinum* and *Cl. sporogenes* spores by sodium nitrite heated in a laboratory medium (SBCM medium [See *Journal of Food Technology* (1967) 2 377]). Also studied were the effect of prolonged incubation, survival of spores in the presence of the inhibitor and the stability of the unknown inhibitor. Heated sodium nitrite was more inhibitory to the spores than nitrite added as a filter-sterilized solution to the SBCM medium. Most spores remained refractile after inhibition for >3 months and some proved viable when inoculated into fresh nitrite-free medium. The inhibitory activity of heated nitrite medium was not stable indefinitely, growth sometimes occurred on re-inoculation with vegetative cells. It is uncertain whether the inhibitor of *Clostridium* spp. formed by heating in SBCM medium has any relevance to heated cured meat products. JA

### 39

#### [Filling machines for meat and meat products.]

Füllmaschinen für Fleisch und Fleischwaren.

[Lecture]

Plewa, M.

*Fleischwirtschaft* 54 (7) 1155–1159 (1974) [De] [H. Vemag, 3090 Verden-Danelsen, Schwanenweg 5, Federal Republic of Germany]

Details are given of various filling machines for sausages and other meat products, including discontinuous piston fillers, continuous vacuum fillers, volumetric portioning machines, and can filling machines linked to continuous vacuum fillers. RM

### 40

#### Automatic Storage/handling system - one pallet in-out every 1.2 min.

Shaw, F.; Morrison, D. J.; Patti, A. S.; Stinson, W. S.

*Food Processing* 35 (6) 18–19, 22 (1974) [En]

Armour-Dial's new 423 000  $\text{ft}^2$  sterile canned meat processing facility at Fort Madison, Illinois, USA, is described. It incorporates 4 separate and complete processing and packaging systems for: Vienna sausage; meat spreads; luncheon meat; and chilli, mash and stews. Two significant features are the extensive use of high-production cookers/sterilizers, and the automatic storage/handling system. Four 65 ft high steam hydrostatic cookers for continuous cooking and sterilizing of canned foods are capable of processing more than 100 million lb product/yr. The raw materials and finished goods handling system employs 15 automated cranes to receive, store and retrieve pallet loads of raw materials, ingredients and finished products. AA

### 41

#### The stability & safety of pasteurized canned cured meat with respect to bacterial spores. [Review]

Roberts, T. A.

*IFST Proceedings* 6 (3) 126–129 (1973) [32 ref. En] [Meat Res. Inst., Langford, Bristol, BS18 7DY, UK]

### 42

#### [Vacuum-automat for meat products and ready-to-eat dishes.] Vakuum-Automat für Wurstwaren und Fertiggerichte.

Anon.

*Fleischwirtschaft* 54 (5) 868 (1974) [De]

[Alupak AG, CH 3121, Bern-Belp, Aemmenmattstrasse 45, Switzerland]

A fully automatic machine for filling, evacuation and sealing of lightweight Al cans (capacity 7.5–400 g) is described; throughput is 40–45 cans/min. Accurate can filling and smooth transfer of filled cans minimize contamination of the rims. A test system for the bursting strength of the cans and the thickness of the seams is also described. RM

### 43

#### [Effects of vacuum on canned meat.] Vakuum-Einfluss auf Fleischkonserven. [Lecture]

Wirth, F.

*Fleischwirtschaft* 54 (8) 1301–1305 (1974) [De]

[Bundesanstalt für Fleischforschung, 8650 Kulmbach, Blaich 4, Federal Republic of Germany]

The effects of vacuum processing on the quality of canned meat products are discussed, with reference to: effects on product quality (colour, flavour, consistency); vacuum treatment at various stages of processing (comminution of raw materials, mixing, can filling, can sealing); changes during storage of evacuated cans; and heat penetration during sterilization in stationary or rotary autoclaves. Effects on product quality were beneficial, especially during storage. Heat





penetration rate during stationary sterilization was generally increased, while the heat penetration rate during rotary sterilization generally decreased, especially for coarsely-chopped meat stews. RM

#### 4 4

##### **Nitrite in curing - the fate of nitrogen.**

Walters, C. L.

*IFST Proceedings* 6 (3) 106-110 (1973) [En]

[British Food Manufacturing Ind. Res. Assoc., Leatherhead, Surrey, UK]

Following a few explanatory details concerning the various haem compounds to be found in muscle, the following aspects of the fate of nitrite in curing are dealt with: factors affecting the disappearance of nitrite in contact with muscle tissue; reactions of nitrite relevant to muscle components and their anticipated products; and observed products of the use of nitrite in curing. JA

#### 4 5

##### **[Determination of protein in export canned meat products by calculation.]**

Körmendy, L.; Losonczy, S.

*Husipar* 23 (2) 73-75 (1974) [14 ref. Hu, de, ru, en] [Husipari Kutato Intezet, Budapest, Hungary]

Problems of calculation of the protein content of canned meat products for export are discussed. It was observed that there were systematic errors in calculation of the protein content from the moisture and fat contents. Experiments showed that fat concn. determined by the Gerber method were significantly lower than values determined by the Soxhlet method. When the moisture content was determined by a rapid method based on drying at 180°C, a correction factor was required to compensate for the systematic error. It is concluded that automated Kjeldahl analysis is the best method for determination of protein in canned meat products. IF





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H. BROOKES  
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1

**[The effect of water activity regulation on the problems of canning of meat.]**

Blanka, R.

*Zpravodaj Masneho Prumyslu* No. 2, 39-43 (1973) [Cs] [Vyzkumny Ustav Masneho Prumyslu, Brno, Czechoslovakia]

Problems of regulation of water activity in canned meat products are discussed, with reference to decreasing the water activity by increasing the salt concn. or decreasing the water concn. Both these methods result in adverse effects on the organoleptic properties of the product, and are not in use at present in Czechoslovakia. STI

2

**[The application of ionizing radiation for prolongation of the shelf-life of preserves.]**

Rusz, J.; Bystra, K.

*Zpravodaj Masneho Prumyslu* No. 3, 32-37 (1973) [Cs, en] [Vyzkumny Ustav Masneho Prumyslu, MBrno, Czechoslovakia]

A combined process (based on heat treatment and gamma irradiation) for improvement of the shelf-life of canned meat products was tested; frankfurters in brine (in 800 g cans) and hams (in 900 g cans) were used in the experiments. Results with the canned frankfurters showed that irradiation at doses of 200 or 400 krad had little microbicidal effect and adversely affected the organoleptic properties of the product. Similar results were achieved in studies on irradiation of canned ham at doses of 10-1000 krad. STI

3

**The flavor of canned meat. Influence of processing conditions and storage.**

Persson, T.; Sydow, E. von

*Abstracts of Papers, American Chemical Society* 168, AGFD 5 (1974) [En] [Swedish Inst. for Food Preservation Res. (SIK), Fack, S-400 21 Gothenburg, Sweden]

Influence of processing conditions on chemical and sensory flavour properties of canned beef samples of various formulations was studied, e.g. HTST sterilization, aseptic canning, sterilization in various packaging materials including flexible pouches. Storage changes were also studied. Volatile compounds were analysed by a gas chromatographic technique in which headspace sampling permitted analysis of large volumes. Compounds were identified by MS. About 100 compounds were identified, e.g. 21 S compounds, 12 aldehydes and 16 ketones. For sensory evaluation a panel was trained to recognize and assess intensities of various odours. It was concluded that off-flavour in canned beef could be related to certain aldehydes, especially 2-methyl

propanol, 2- and 3-methyl butanol, and S compounds, especially H<sub>2</sub>S, methyl mercaptan and dimethyl sulphide. It was shown, for instance, that products sterilized in flexible pouches at 131°C gave a product with improved flavour properties compared to those sterilized at 115°C to the same F<sub>0</sub>-value (= 10). The concn. of off-flavour compounds decreased markedly when the temp. was increased from 115 to 131°C. AS

4

**[Use of a protease preparation in the canned meat industry.]**

Rose, P.

*Elelmezsi Ipar* 28 (8) 236-237 (1974) [Hu, ru, de, en] [Központi Elelmeszeripari Kutató Intézet, Budapest, Hungary]

Incubation of boiled pork chop bones with a *Bacillus subtilis* neutral protease preparation for 1 h at 50°C gave a protein yield of 330-460 g/kg bones; this is approx. double the yield achieved without use of the protease preparation. IF

5

**Minimum nitrite concentrations for inhibition of clostridia in cooked meat products.** In "Proceedings of the International Symposium on Nitrite in Meat Products". [Conference proceedings]

Grever, A. B. G. (Netherlands, Central Institute for Nutrition & Food Research TNO) pp. 103-109 ISBN 90-220-0463-5 (1974) [11 ref. En] Wageningen, Netherlands [Central Inst. for Nutr. and Food Res. TNO, Utrechtseweg 48, Zeist, Netherlands]

Laboratory- and factory-prepared cooked sausage and liver sausage emulsions (brine percentage 3.5, nitrite concn. 0-200 mg/kg) were packaged in 76 × 35 mm cans (with or without inoculation with clostridia or various spore-bearing materials) and pasteurized to a core temp. of 80°C for 10 min. The pasteurized cans were then stored for 1, 3 or 5 wk at 24°C, after which they were tested for residual nitrite content and growth of spore-forming bacteria. Similar studies were conducted on luncheon meat and liver paste emulsions (containing 100 or 200 mg nitrite/kg) inoculated with spore counts of 100 or 500/g, canned, and heated at 95 or 105°C with F<sub>0</sub> values of 0.05 or 0.5 respectively. Growth of spore-forming bacteria was evaluated after incubation for 5 wk at 30°C. Detailed tables and diagrams of results are given. The studies on pasteurized emulsions showed that a nitrite concn. of 200 mg/kg and pH ≤ 6.2 is necessary to guarantee complete prevention of growth of clostridia. The studies on sterilized samples showed incomplete inhibition of clostridia in samples heated to an F<sub>0</sub> value of 0.05, even in the presence of 200 mg/kg nitrite. No growth of clostridia occurred in samples heated to a F<sub>0</sub> value of 0.5. Bacilli were less nitrite-sensitive than clostridia. AJDW





## 6

**Inhibitors in cooked meat products.** In "Proceedings of the International Symposium on Nitrite in Meat Products". [Conference proceedings]  
 Roon, P. S. van (Netherlands, Central Institute for Nutrition & Food Research TNO)  
 pp. 117-124 ISBN 90-220-0463-5 (1974) [16 ref. En] Wageningen, Netherlands [Inst. of Food Hygiene, Dept. of Meat Tech., Fac. of Vet. Sci., Univ. of Utrecht, Biltstraat 172, Netherlands]

The possible formation of inhibitory iron-nitrosyl coordination complexes in canned cured meat products is discussed, with reference to studies on inhibition of clostridia by Black Roussin salt (BRS) and cysteyle-nitrosyl complexes formed by reaction of cysteine and  $\text{FeSO}_4$  with  $\text{NaNO}_2$  or NO. The results showed that both BRS and the cysteyle-nitrosyl-Fe coordination complex inhibited growth of clostridia. A tentative method (based on extraction with methanol, purification on an  $\text{Al}_2\text{O}_3$  column and determination by spectrophotometry at 350 nm) was developed; recovery from luncheon meat containing added BRS was 47%. No BRS was detected in samples of normal luncheon meat or luncheon meat containing added  $\text{FeSO}_4$  and/or cysteine. Possible reasons for its absence are discussed. The likelihood of formation of cysteine-nitrosyl-Fe coordination complexes in canned cured meat products is briefly discussed, with reference to the absence of a detectable Perigo effect in heated cured meat products. AJDW

## 7

**Stability of red food colours in the presence of nitrite in canned pork luncheon meat.**  
 Knowles, M. E.; Gilbert, J.; McWeeny, D. J.  
*Journal of the Science of Food and Agriculture* 25 (10) 1239-1248 (1974) [22 ref. En] [Food Sci. Div., Min. of Agric., Fisheries & Food, Colney Lane, Norwich, NOR 7OF, UK]

The stability of 9 red food colours in pork luncheon meat products in the absence and presence of nitrite was investigated. The extracted dyes were examined by visible and UV spectrophotometry and paper chromatography for changes due to processing and to the presence of nitrite. All the colours were destroyed to some extent but with nitrite more of the food colour survived. Subsidiary dye components and colourless fluorescent products were formed as a result of heat processing and in certain cases additional products were observed in the presence of nitrite. AS

## 8

**[Microbiological methods for examination of fully-preserved and semi-preserved products.]** Zur Methodik der mikrobiologischen Untersuchung von Voll- und Halbkonserven. [Lecture]  
 Sinell, H. J.  
*Fleischwirtschaft* 54 (10) 1642-1646 (1974)

[many ref. De, en, fr] [Inst. für Lebensmittelhygiene, Fleischhygiene und -tech., Freie Univ., 1000 Berlin (West) 33, Bitterstrasse 8-12]

The reasons and methods for bacteriological examination of canned meat products are discussed on the basis of literature data. RM

## 9

**[Quality of meat products from the viewpoint of regulations and results of their examination on the Belgrade market.]**

Potparic, M.

*Hrana i Ishrana* 75 (1/2) 50-56 (1974) [10 ref. Sh, en] [Savezni, Trzisni Inspektorat, Belgrade, Yugoslavia]

Various meat products from the Belgrade market were classified on the basis of laboratory inspection and organoleptic assessment by an expert panel into the following quality categories: sub-standard, satisfactory, 3rd quality, 2nd quality and 1st quality. % category distributions are tabulated for a total of 394 samples of 17 different meat product groups. % of sub-standard products were (number of samples in parentheses): canned luncheon meat and pate (50), 18.0; limited storage life sausages (106), 22.5; cooking and boiling sausages (54), 43.0; and grilled meat dishes, by organoleptic assessment only (184)m 47.2. SKK

## 10

**[Sensory and chemical quality control during manufacture of canned meats.]** Sensorische und chemische Qualitätskontrolle bei der Herstellung von Fleischkonserven

Bertling, -.

*Fleischwirtschaft* 54 (10) 1616-1618 (1974) [De] [5600 Wuppertal 2, Sanderstrasse 161, Federal Republic of Germany]

## 11

**Evaluation of the stability of sausage emulsion by the canning of mutton sausages.**

Selvarajah, R. G.; Madaiah, N.; Baliga, B. R.

*Journal of Food Science and Technology, India* 11 (2) 45-49 (1974) [8 ref. En] [Central Food Tech. Res. Inst., Mysore, India]

The stability of canned mutton sausages (containing curing agents, spices, binder, precooked carrot and tomatoes, and garlic, onion, coriander leaves, green chillies and green ginger) was evaluated. Batches of sausages containing (i) 40, (ii) 45, (iii) 50 or (iv) 55% lean mutton were prepared, canned, autoclaved and stored for 13-15 days, 28-30 days or 1 yr at room temp. (25-27°C), 35°C or 55°C, after which their quality was evaluated. Quality criteria considered included wt. loss at various stages of processing and storage,





water absorption, fat separation, pH and turbidity of the medium and splitting and disintegration of the sausages. Tables of results are given. (ii) had the lowest wt. loss. The incidence of splitting and disintegration tended to decrease with increasing meat content of the sausages. Fat separation was highest in (i) and lowest in (ii). Fat separation and splitting and disintegration of the sausages increased with increasing storage temp. Water absorption was highest in (ii) and lowest in (iv). It is concluded that (iii) is the most suitable meat content for canned mutton sausages. AJDW

## 12

**Perigo effect in pork.** In "Proceedings of the International Symposium on Nitrite in Meat Products". [Conference proceedings] Pivnick, H.; Chang, P.-C. (Netherlands, Central Institute for Nutrition & Food Research TNO) pp. 111-116 ISBN 90-220-0463-5 (1974) [13 ref. En] Wageningen, Netherlands [Food Res. Lab., Food Directorate, Health Protection Branch, Health and Welfare Canada, Ottawa, Canada]

An inhibitor against *Clostridium botulinum* was formed when canned pork luncheon meat was processed to  $F_0 = 0.4$ . The meat was manufactured with 0-300 mg/kg of  $\text{NaNO}_2$  and all of it was held at 35°C after processing until the highest concn. of nitrite declined to less than 2 mg/kg. Meat in cans was then inoculated with spores of *Cl. botulinum* that had survived a heat treatment of  $F_0 = 0.4$  in a solution of raw meat juice, 4.5% salt and 150 mg/kg of  $\text{NaNO}_2$ . The inhibitory effect could be demonstrated by an increase in time required for inoculated cans to swell and by the number of spores required to initiate growth and cause swelling. However, the inhibitory effect was relatively small; meat made with 3.8% salt in the water phase and 200 mg/kg of nitrite inhibited 3.3  $\log_{10}$  of spores (3.3 units of inhibition). Salt contributed 1.86 units and the inhibitor formed from nitrite contributed 1.43 units. AS

## 13

[Evaluation of beef goulash.]

Harms, F.; Beck, G.

*Archiv für Lebensmittelhygiene* 25 (10) 222-224 (1974) [7 ref. De, en] [St.

Veterinäruntersuchungsamt, Hanover, Federal Republic of Germany]

The suggestion of Linke [*Archiv für Lebensmittelhygiene* (1973) 24 101-104] that the min. meat DM concn. in canned 'Mastrindgulasch' (beef goulash) should be reduced to 12% (as compared to 14% for other goulash types) is critically discussed on the basis of an extensive survey of the composition of beef goulash and other goulash types in various regions of the Federal Republic of Germany. Tables of values are given for the meat content (wet wt.) meat DM content, connective tissue content, fat content, moisture content and number and % of samples containing

<14% meat DM. The results show that samples labelled 'Mastrindgulasch' have a higher meat content and a lower % of samples containing <14% meat DM than other goulash types. It is therefore concluded that there is no reason to reduce the min. meat DM content of 'Mastrindgulasch'. AJDW

## 14

**Effect of sodium nitrite on *Clostridium botulinum* in canned luncheon meat: evidence for a Perigo-type factor in the absence of nitrite.**

Chang, P.-C.; Akhtar, S. M.; Burke, T.; Pivnick, H. *Canadian Institute of Food Science and Technology Journal* 7 (3) 209-212 (1974) [23 ref. En, fr] [Microbiol. Div., Res. Lab., Food Directorate, Health Protection Branch, Health & Welfare Canada, Ottawa, Ontario, Canada]

Canned shelf-stable luncheon meat containing varying amounts of sodium nitrite, prepared according to a commercial formula, was processed at 110°C to  $F_0 = 0.4$  and held at 35°C until nitrite was no longer detectable. The meat was then inoculated with spores of *Clostridium botulinum* separately heated to  $F_0 = 0.4$  and the cans were incubated at 30°C. Swelling of cans with concomitant toxin production was related directly to the size of the inoculum and inversely to the concn. of nitrite at time of manufacture. Meat containing 200 ppm nitrite at time of manufacture (<2 ppm when inoculated) inhibited 1.43  $\log_{10}$  more spores than meat that was manufactured without nitrite. It appears that an inhibitor, which we call Perigo-type Factor, is formed during commercial processing of shelf-stable luncheon meat that contains nitrite. AS

## 15

**[Simplified spectrophotometric method for assessment of colour of comminuted canned meat.]**

Uchman, W.; Harabasz, J.; Pezacki, W.

*Przemysł Spożywczy* 28 (3) 114-117 (1974) [18 ref. Pl, ru, en, fr, de] [Inst. Tech. Żywności, AR, Poznań, Poland]

Light reflection by comminuted contents of 150 'Tourist' meat cans from several batches was measured using a Specol (Carl Zeiss, Jena) spectrophotometer. The results were interpreted in CIE units and correlations between the 3 CIE colour characteristics and light reflection at selected wavelengths of 540, 560, 640 and 680 nm were calculated using 3 types of regression. It is concluded that measurement of reflection coeff. at a chosen single wavelength (e.g., 580 or 640 nm) suffices for colour characterization of comminuted canned meat, each of the 3 colour characteristics being calculated using a single rectilinear relation equation for the reflection coeff. determined at 1 wavelength. SKK





16

**Canned meat products.**

Martin, C. R. A.

*British Food Journal* 76 (861) 110-111, 114 (1974) [En]

The Canned Meat Products Regulations (1967) are discussed with reference to problems encountered in their interpretation. AA

17

**[Requirements to be met by canned meats.]**

Italy, Unione Nazionale Consumatori

*Industria Agraria* 11 (9) 297-302 (1973, publ. 1974) [It]

The results of an agreement between the Italian Consumers' Association and the manufacturing industry establishing the min. requirements (with particular reference to wt.) of canned meat in gelatin are given. The results of an analysis of 38 types of canned meats in gelatin, carried out by the Association and covering a total of 109 cans, are tabulated in detail. The main point of the agreement is that the content of cooked meat shall average  $\geq 41\%$  of net wt. for 20 samples not from the same batch (min. permissible wt. of a single sample, 37%). HBr

18

**[Automation of heat treatment in autoclave sterilization or pasteurization of meat in cans.]**

Mangarudov, I. [A.?] R.

*Khranitelna Promishlenost* 21 (6) 14-16 (1972)

[5 ref. Bg, ru, de, fr, en] [NITPKI po Mesopromishlenost, Bulgaria]

An automated installation permitting programming of meat sterilization or pasteurization in cans using vertical batch autoclaves is described and diagrammatically illustrated; a diagram of the electric circuit is included. SKK

19

**[The use of carageenans in the manufacture of semi-perishable canned meat products.]**

Panin, J.; Polic, M.; Dordevic, M.

*Tehnologija Mesa* 15 (3) 82-84 (1974) [2 ref. Sh, en] [Jugoslovenski Inst. za Tehnologiju Mesa, Belgrade, Yugoslavia]

Studies on the use of carageenans as a substitute for gelatin in pasteurized canned meat products are discussed; results showed that carageenans can be used at concn.  $\leq 0.3\%$ , higher concn. giving a bitter off-flavour in the product. STI

20

**[The influence of meat disintegration and juice addition on heating of canned meats.]**

Wojciechowski, J.; Harabasz, J. S.; Pezacki, W.

*Przemysł Spożywczy* 28 (11) 407-409 (1974) [8 ref. Pl, ru, en, fr, de]

The effects of meat disintegration, content of liquid phase and distance from can walls on the spatial dynamics of the heating of canned meats were investigated. Degree of mincing was found to have the least effect on the heating time, but the amount of juice added and above all the distance from tin walls were decisive. Regression equations for determining the sterilization value as a function of the experimental factors are given. AS

21

**[Effect of different temperatures of cooling and storage of pasteurized canned ham on extent of microbial contamination.]**

Stankiewicz-Berger, H.; Zajackowski, E.

*Roczniki Instytutu Przemysłu Mięsnego* 10, 137-146 (1973) [7 ref. Pl, ru, en] [Inst. Przemysłu Mięsnego, Warsaw, Poland]

Canned hams (2270 g meat/can) were cooled after pasteurization to reach 30°C in the centre in ice water at approx. 0°C, water at 7-8°C, running water at 17-18°C or air at from -5° to 0°C. They were then stored for 10 days at 2°C and examined for total bacterial counts and amount of drop (jelly). In further, model experiments, 200-g portions of ground ham were pasteurized in cans (90 min to reach 66°C inside and holding at this temp. for 30 min); cooling was in running water at 18°C and subsequent storage was at 0-1°, 4-5° or 9°C for 12 months. The results are tabulated and graphically presented. Cooling of the commercial hams in ice water was the most rapid, but no correlation was found between the different cooling methods and total bacterial counts or quantity of jelly. In the model experiments, storage at 0-1°C had a stabilizing effect on total bacterial counts; and the count also remained stable in ground ham with initial counts of 300/g stored at 4-5°C. Though the prescribed storage at 4-6°C of Polish pasteurized canned hams ensures quality retention during the guaranteed term by correctly processed hams, storage at 0-1°C is recommended to meet increasingly stringent requirements of importers. SKK

22

**[Brief summary of USSR meat industry production for 1973.]**

Esin, N.

*Myasnaya Industriya SSSR* No. 3, 13-14 (1974)

[Ru] [Planovo-ekonomicheskoe Upravlenie Min. Myasnoi i Molochnoi Promyshlennosti SSSR, USSR]





Production by the Soviet meat industry in 1973 included ('000 t): meat 7526.7, poultry meat 328.5, smoked products 2532.8, melted fats 311.6, semimanufactured meat products 788.2, and canned meat 284.7. STI

## 23

[Use of fish protein preparation in canned meat manufacture.]

Zuchowicz, S.

*Przemysł Spożywczy* 28 (12) 539-541 (1974) [2 ref. Pl. ru. en. fr. de] [Wojewódzkie Przedsiębiorstwo Przemysłu Mięsnego, Gdansk, Poland]

A protein preparation made from fresh or frozen fat or other fish [see Krassowska & Stala, *FSTA* (1972) 4 4G165] was used. It consists of a white, tasteless fine-fibered hydrated protein isolate containing approx. 70% moisture and 30% protein with <0.5% fat and <0.5% ash. 30% of the protein is undenatured; the preparation has marked blending and emulsifying properties and retains the nutritive value of fish protein; the total bacterial count is <10 000/g. The cost is assessed at zł 45/kg. Recipes for canned minced beef, 'Tourist preserve', 'English goulash' and frankfurters including 5-10% of the preparation are tabulated. Panel tests showed that the addition had no significant effect on the organoleptic quality of the canned foods tested. The economic advantages of the addition are pointed out. SKK

## 24

[Veterinary evaluation of meat of tuberculous cattle and means of rendering it fit for human consumption.]

Kondrat'ev, I. A.

*Trudy, Ukrainskii Nauchno-Issledovatel'skii Institut Myasnoi i Molochnoi Promyshlennosti* No. 2, 1, 104-113 (1972) [25 ref. Ru] [Ukrainskii Nauchno-issled. Inst. Myasnoi i Molochnoi Promyshlennosti, USSR]

In the USSR, meat of tuberculous animals may be used for food provided it is rendered harmless by suitable means. Methods of detection of tuberculous infection of cattle and carcasses and problems of resistance of the tubercle bacilli are considered in detail. It is concluded from experiments with naturally and experimentally infected meat that boiling for a suitable time leads to marked losses of substance and nutritive value. It is recommended that tuberculous meat should be used for meat loaves and that the loaves should be baked so as to achieve a temp. of 85°C in the interior of the loaf. It was also found that canned braised beef from tuberculous meat contained no tubercle bacilli after sterilization at 120°C for 25-75-30 min. SKK

## 25

Effects of ionizing radiation on gelatin in the solid state. (In "Improvement of food quality by irradiation".) [Conference proceedings]

Bachman, S.; Galant, S.; Gasyna, Z.; Witkowski, S.; Zegota, H.

pp. 77-94 (1974) [25 ref. En] Vienna, Austria; International Atomic Energy Agency [Inst. of Applied Radiation Chem., Tech. Univ., Lodz, Poland]

Tabulated data on the effect of  $^{60}\text{Co}$   $\gamma$ -irradiation on some technological and physico-chemical properties of gelatin irradiated in the solid state are given. Contamination of gelatin in the meat and ham canning industry was relatively small and in the case of insignificant surface contamination the sterilization dose was 0.5-1.0 Mrad. The sterilizing effect of irradiation increased during storage of the sample. Organoleptic changes appearing in gelatin at doses above 0.5 Mrad were not detectable in canned meats made with the irradiated gelatin. Doses up to 3.5 Mrad did not greatly change the amino acid composition of gelatin; for doses exceeding 0.5 Mrad, distinct changes were observed in the content of carbonyl groups. The effect of radiation doses of 0.5-3.5 Mrad on degradation of gelatin molecules and increase in polydispersity was demonstrated on the basis of studies on viscosity and optical rotatory dispersion. Ionizing radiation induced the formation of free radicals, producing electron spin resonance spectra in the form of a symmetrical doublet. The kinetics of free-radical decay in gelatin while stored at room temp. in the presence of air were also studied. The studies performed may serve as evidence for arguments in favour of legalizing the process of radiation sterilization of gelatin. GL

## 26

[The possibility of manufacture of semi-preserved meat by direct addition of brine to the meat using special meat kneading equipment.]

Radetic, P.

*Tehnologija Mesa* 15 (4) 121-122 (1974) [Sh] [Jugoslovenski Inst. za Tehnologiju Mesa, Belgrad, Yugoslavia]

Manufacture of ham without injection of curing brine (by a process based on kneading the meat with 2.2% NaCl, 0.07% NaNO<sub>2</sub>, 0.05% NaNO<sub>3</sub>, 0.4% polyphosphates and varying quantities of water for 12 h) was studied. The ham was then canned and pasteurized. Examination after storage for 3 wk showed that ham manufactured by this method was inferior to that manufactured by the conventional method. STI





## 27

[The effect of ham curing method on the water binding capacity, pH and amount of aspic in canned ham.]

Dakovic, B.; Lazarevic, J.; Bikicki, D.; Panin, J. *Tehnologija Mesa* 15 (5) 154-155 (1974) [5 ref. Sh, en] [Jugoslovenski Inst. za Tehnologiju Mesa, Belgrade, Yugoslavia]

The effects of 2 methods of treatment of hams after brine injection (i) leaving stationary for 48 h or (ii) mechanical turning for 20 min/h for 24 h) on the water binding capacity, pH and release of gelatin by pasteurized canned hams were studied. (i) released 3% more gelatin than (ii); pH did not differ significantly. Water binding capacity of (i) was optimal after 32 h; that of (ii) was optimal after 16 h. STI

## 28

[Studies on factors affecting the results of determination of total additives added to canned ham using the American formula.]

Pospisil, A.

*Tehnologija Mesa* 15 (6) 162-168 (1974) [9 ref. Sh, en] [Mesna Ind. "Sljeme", Sesvete, Yugoslavia]

The USDA formula for calculation of the total quantity of additives in canned cured meat is critically discussed on the basis of experimental data. It is suggested that the ratio water:protein is more accurate. To comply with the USA tolerance of a max. of 8% total additives in canned cured meat, the water:protein ratio should not exceed 4.2. STI

## 29

[Applications and behaviour of metal cans for meat packaging.] Metallverpackungen Anwendungsmöglichkeiten und Verhalten bei Fleischkonserven.

Habenicht, G.

*Fleischwirtschaft* 54 (12) 1917-1920 (1974) [De] [Schmalbach-Lubeca GmbH, 3300 Braunschweig, Postfach 3307, Federal Republic of Germany]

Developments in tinplate and Al cans for meat products are reviewed, including easy-opening systems, prevention of corrosion, storage behaviour, prevention of discoloration, sterilization and evacuation. RM

## 30

[World trade in canned meat.] Zur Weltlage bei Fleischkonserven.

Anon.

*Fleischwirtschaft* 55 (2) 210 (1975) [De]

The production, imports and exports of canned meat from the 21 principal countries concerned are

tabulated for 1965, 1969 and 1970-1972. Main producers in 1972 were ('000t) USA 1150.0, Federal Republic of Germany 237.8 and Denmark 206.1; main exporters were Denmark 192.7, Netherlands 94.1 and Poland 55.3; main importers were USA 190.3, UK 175.9 and Federal Republic of Germany 79.0. RM

## 31

[Method for the investigation of meat preserves in the laboratory.] [Conference proceedings]

Havas, F.

*Konzerv-es Paprikaipar* Special issue, pp. 10-12 (1974) [Hu, ru, de] [HAESZ Kirendeltseg, Kaposvar, Hungary]

This paper (presented at the 6th Conference on 'Hygiene in the food preservation industry' held in Nagykoros, Hungary, May 1974) gives details of a quality control programme for various stages of the manufacture of canned ham. The finished product is tested after storage for 14 days at 5°C; keeping quality trials are conducted on samples held for 5 days at 30°C. Details are given of tolerances for spore-formers, micrococci, total count, toxigenic microorganisms, enterococci and blown cans. Chemical tests include detn. of polyphosphates, nitrates, nitrites, ascorbic acid, metals, pesticides, bacitracin and hormones. In 1972, >26 000 cans were tested; <3% were of unacceptable quality. IF

## 32

[Method for preparation of canned meats.]

Dedash, V. G.

*USSR Patent* 449 706 (1974) [Ru]

To accelerate the canning process and improve product quality, 250 g pieces of meat, e.g. ham, are salted with dry ingredients and nitrite by mixing for 2.5-5 min, packed into cans, sealed, allowed to mature for 12-24 h at 4-10°C, and sterilized. W&Co

## 33

[The degree of sterilization of pasteurized canned products.]

Stamenkovic, T.; Dordevic, L.; Markovic, M.

*Tehnologija Mesa* 15 (7/8) 215-218 (1974) [30 ref. Sh, en] [Jugoslovenski Inst. za Tehnologiju Mesa, Belgrade, Yugoslavia]

Temp. at the geometrical centre of pasteurized canned hams in were studied during the whole period of thermal processing (lasting 30 min), during storage, and during incubation testing at 37°C, at 10-14°C and at 30-31°C for 24 or 72 h. Results are discussed in relation to the surviving microflora. STI





## 34

[Examination and evaluation of canned meat and sausages.] Untersuchung und Beurteilung von Fleisch- und Wurstkonserven.  
Untze, W.

*Fleischwirtschaft* 55 (4) 477-479 (1975) [21 ref. De] [Fachbereich Lebensmitteltech., Tech. Hochschule, Berlin]

Principles of sensory, statistical, microbiological and chemical evaluation of meat products are discussed, and some routine chemical methods tabulated. RM

## 35

Studies on the ultimate fate and distribution of nitrite in a cured meat product.

Sebranek, J. G.

*Dissertation Abstracts International, B* 35 (7) 3381: Order no. 74-19939 (1975) [En] [Wisconsin Univ., Madison 6, Wisconsin, USA]

A  $^{15}\text{N}$  tracer technique was employed in an attempt to elucidate reactions in which nitrite takes part during the curing of meat and to gain knowledge on any possibly carcinogenic nitrosamines that might be formed. The stability of nitrite in simple aqueous solutions was studied as well as the proportion of nitrite recovered by the Kjeldahl procedure. The distribution of  $^{15}\text{N}$  in cured and canned meat during different heat treatments was followed in the various fractions (water soluble, salt soluble, salt insoluble, gaseous, pigment bound). Residual nitrite decreased and increased tracer appeared mainly in the water soluble and protein bound fractions. The tracer increased by 25-35% in the water soluble fraction, mainly in a compound of an estimated mol. wt. of 130 which proved negative to ninhydrin and a sulphhydryl group reagent and non-inhibiting to the growth of *Clostridium botulinum* types A and B. FSB

## 36

[The effect of temperature on the dynamics of decomposition of nitrite and on the formation of nitrosomyoglobin in beef.]

Cavlek, B.; Satovic, V.; Matic, S.

*Tehnologija Mesa* 15 (7/8) 206-211 (1974) [30 ref. Sh, en] [Tehnoloski Fak., Zagreb, Yugoslavia]

Effects of temp. during canning of beef on nitrite decomposition and nitrosomyoglobin formation are discussed. Nitrite decomposition was found to be closely related to nitrosomyoglobin formation, these reactions being enhanced by addition of ascorbic acid. Addition of 10 mg nitrite/100 g meat gave acceptable red coloration of the canned beef. STI

## 37

[Possibilities of aromatizing semi-perishable canned products.]

Polic, M.; Trumic, Z.; Modic, P.

*Tehnologija Mesa* 15 (7/8) 222-224 (1974) [4 ref. Sh, en] [Jugoslovenski Inst. za Tehnologiju Mesa, Belgrade, Yugoslavia]

Canned pasteurized hams are at present manufactured without smoking. This results in insufficient autolytic and biochemical changes in the meat. Studies on the use of spices and the Japanese smoke preparation 'Ban-Aroma S' to improve the flavour of canned hams are described; addition of garlic + celery gave the best results. STI

## 38

[Production of meat rolls: use of raw or precooked meat.] Herstellung von Fleischrouladen:

Roheinwaage oder vorgebraten? [Lecture]

Kofahl, W.; Reichert, J. E.

*Fleischwirtschaft* 54 (12) 1902-1904 (1974) [2 ref. De] [Konserven-Inst., 2350 Neumünster, Kieler Strasse 204, Federal Republic of Germany]

Comparative studies on canning of (i) raw and (ii) pre-fried (deep-fat frying for 1 min at 180°C) beef roulades are described. Canned (i) and (ii) samples were sterilized at 110°, 120°, or 130°C in a rotary autoclave, and the required sterilization time, sterilization loss and organoleptic properties of the products were evaluated. Tables of results are given. Deep-frying resulted in a wt. loss of 12-15% (as compared to a literature value of 28% for pan frying). Sterilization loss of (ii) decreased with increasing sterilization temp. (from 32.05% at 110°C to 26.47% at 130°C); that of (i) remained approx. constant. Organoleptic properties improved with increasing sterilization temp.; the organoleptic properties of (ii) were significantly better than those of (i). [See also FSTA (1970) 2 8S745 and (1974) 6 10G595.] RM

## 39

[The effect of polyphosphates on weight losses of minced beef during heat processing.]

Zivkovic, J.; Kovacevic, M.; Bokulic, A.

*Tehnologija Mesa* 15 (9) 262-264 (1974) [19 ref. Sh] [Inst. za Fiziologiju i Patologiju Animalne Proizvodnje, Zagreb, Yugoslavia]

The amount of juice separating from canned minced beef during sterilization (25 min at 115°C) or pasteurization (45 min at 70-75°C) was studied, with reference to effects of temp. during meat comminution (warm, chilled or frozen) and the amount of water added during comminution. For chilled meat, juice loss during sterilization was 27.5-49.5%; juice loss during pasteurization was 11.4-44.2%, depending on the amount of water added. Addition of 0.35% polyphosphates to the meat reduces juice loss by an average of 4.34%. STI





## 40

[A contribution to the anatomical structure of pork spare rib and its importance for the production of semi-preserved meat in cans.]

Mihajlovic, B.

*Tehnologija Mesa* 15 (9) 247-253 (1974) [13 ref. Sh, en] [Jugoslovenski Inst. za Tehnologiju Mesa, Belgrade, Yugoslavia]

Morphological characteristics of all muscles in the spare rib of pork are presented, including the measurements of the individual muscles (length, width, thickness) and their wt. Pork spare ribs weighing 95 kg were studied. Of 16 muscles present in the spare rib, 4 muscles weighing an average total of 633 g represent high quality raw material for pasteurized canned pork. It was found that most pork spare rib muscles differed very little from the thigh muscles. All muscles present in the spare rib are shown on photographs. STI

## 41

Influence of sodium nitrite on the chemical and organoleptic properties of comminuted pork.

Hadden, J. P.; Ockerman, H. W.; Cahill, V. R.; Parrett, N. A.; Borton, R. J.

*Journal of Food Science* 40 (3) 626-630 (1975) [13 ref. En] [Dept. of Animal Sci., Ohio St. Univ., Columbus, Ohio 43210, USA]

Objectives of a study undertaken to further develop present knowledge of the action of sodium nitrite in meat involved an examination of organoleptic and chemical differences occurring between cooked, canned pork emulsions processed with or without added sodium nitrite in samples with or without added NaCl. It appears that sodium nitrite added to cooked, canned comminuted pork plays a vital role in developing and maintaining cured pork flavour. Nitrite was found to retard the rate of oxidative rancidity (thiobarbituric acid value) in this model system. However, it is important to note that in the model system studied, spices, sweeteners and extenders were excluded from the formulation and that the average fat level of the finished product was approx. 17% which is leaner than that used in most commercial formulations. IFT

## 42

[Grouping of strains of streptococci isolated from animal material in relation to their physiological properties.]

Truszczyński, M.; Kocik, T.; Kryszkowski, M.  
*Medycyna Weterynaryjna* 28 (10) 589-591 (1972) [15 ref. Pl] [Zakład Mikrobiol., Inst. Weterynarii, Pulawy, Poland]

175 strains of streptococci isolated from mastitis milk, 57 isolated from canned meat, and 18 collection strains were grouped using rabbit antisera of Lancefield groups B, C and D. The strains were also examined for (i) physiological characteristics and by (ii) the CAMP test. 66 strains

could not be classified by any of the tests. Of 90 strains serologically identified as group B, 51 also showed results of (i) and (ii) characteristic of group B, but for 38 only (i) was characteristic. For 10 group C strains, corresponding figures were 8 and 1; and for 18 group D strains, they were 17 and 0. 46 of 49 strains giving (i) and (ii) results characteristic of group D did not give a typical precipitation with group D antiserum. Simultaneous serological typing and CAMP testing are recommended for this group. [A shortened version of this paper was published under the same title in *Medycyna Weterynaryjna* (1972) 28 (8) 464-466.] SKK

## 43

Meat canning.

Ross, H. M.

*United States Patent* 3 874 426 (1975) [En]

A method for filling containers with precise wt. of a non-uniform material, particularly meat, comprises the steps of first producing a coarse fill under the desired final wt., followed by addition of an extrusion of the material having a uniform predetermined wt./unit length. IFT

## 44

[Two lines for automatic metering of meat during can filling.]

Mangarudov, I.

*Khranitelna Promishlenost* 24 (3) 24-26 (1975) [4 ref. Bg, ru, de, en]

## 45

[Ham curing and tenderizing using mechanical meat processing equipment.]

Stamenkovic, T.; Satovic, V.; Tisljarec, D.; Loncar, A.; Lisicak, S.

*Tehnologija Mesa* 15 (9) 254-257 (1974) [39 ref. Sh, en] [Jugoslovenski Inst. za Tehnologiju Mesa, Belgrade, Yugoslavia]

Methods for curing and tenderization of pork for manufacture of canned hams were evaluated on the basis of the rate of conversion of myoglobin into its nitroxyl derivative, and effects on the nitrite content and consistency of the ham. It was found that meat curing could be considerably accelerated by a special brine injection method and subsequent mechanical kneading. The new curing method also improves product quality. STI

## 46

[Technical aspects of the heating of canned foods in non-centrifugal autoclaves.]

Wojciechowski, J.; Uchman, W.; Piskorska, K.

*Medycyna Weterynaryjna* 30 (10) 583-584 (1974) [9 ref. Pl, ru, en] [Inst. Tech. Żywności Pochodzenia Zwierzęcego AR, Poznań, Poland]

A sterilization value was used to determine the degree of unequal warming of canned luncheon meat, sterilized under commercial conditions. It





was found that cans from various zones of the autoclave differed significantly in the degree of warming (different sterilization values), and the intensity of the heat flow. The results obtained indicate the possibility of obtaining cans showing various degrees of warming in the same production cycle. AS

## 47

**Hormel creates the self-renewing plant.**

Slater, L. E.

*Food Engineering* 46 (12) 55-59 (1974) [En]  
[Food Engineering, Box 2035, Radnor, Pennsylvania 19089, USA]

A description, with photographs, is given of Geo. A. Hormel & Co's. new meat canning and distribution centre south of Beloit, Wisconsin. Meat received in pre-processed frozen 60-100 lb blocks in cartons is tempered to 28-30°F in microwave tunnels at a rate of 6000 lb/h. Tempered blocks are broken, ground, blended and formulated. Products include 15-oz cans of chili, meat spread, and corned and roast beef hash and 7.5-oz cans of e.g. beans with wieners, beef goulash, escalloped potatoes and ham for both vending machines and the retail trade. An X-ray system is used for on-line measurement of product fat content. Clean-in-place systems are used on the formulating lines. 15-oz canned products are cooked in a continuous hydrostatic sterilizer. 7.5-oz canned products are cooked in a battery of horizontal retorts, programmes being controlled by a punch-card system. Details are given of the advantages, operation and costs of microwave tempering. JA

## 48

[Residue problems in animal products. I. Pesticides.]  
Rückstandsprobleme in tierischen Erzeugnissen. I. Mitteilung: Pestizide.

Knapstein, H.  
*Tierzüchter* 27 (5) 197-199 (1975) [De]  
[Landwirtschaftliche Untersuchungs- und Forschungsanstalt, Kiel, Federal Republic of Germany]

This paper includes data for the frequency of contamination of animal feeds and meat with pesticides. Studies on 80 samples of (i) pork, 40 samples of (ii) beef, 40 samples of (iii) poultry and 216 samples of (iv) canned meat showed that only 5% of (ii) and 2.5% of (iii) were free from pesticide residues; all (i) and (iv) samples contained pesticides. The pesticide residues concn. in (ii) and (iii) did not exceed current tolerances in the Federal Republic of Germany. Of the (i) samples, 13.75% exceeded the tolerance for hexachlorobenzene and 1.25% exceeded the tolerance for endrin. Of the (iv) samples, 8.33% exceeded the tolerance for  $\alpha$ - and  $\beta$ -BHC and 6.02% exceeded the tolerance for hexachlorobenzene. It is considered that contaminated feed is the main source of pesticide residues in meat. AJDW

## 49

[Significance of water activity ( $a_w$ ) in the meat industry.]

Dimitrova, N.

*Khranitelna Promishlenost* 24 (3) 33-35 (1975)  
[1 ref. Bg]

This review-type article is based largely on Leistner's work [See FSTA (1972) 4 2S169].  
SKK

## 50

[Advantages and possible applications of thermal processing of canned foods in rotary autoclaves in the food industry.]

Dzoljic, D.; Kocovski, T.

*Tehnologija Mesa* 15 (10) 286-290 (1974) [20 ref. Sh, en] [Jugoslovenski Inst. za Tehnologiju Mesa, Belgrade, Yugoslavia]

Advantages of sterilization and pasteurization of canned meat products in rotary autoclaves are discussed, including: increased shelf-life; improved homogeneity; better retention of structure and consistency; improved colour retention; reduced fat and jelly release; elimination of errors in pasteurization or sterilization conditions; elimination of off-flavour formation; elimination of staining or corrosion of the interior of the cans; reduced power consumption; and increased efficiency. STI

## 51

[Preservation of ham by gamma-irradiation.]

Marseu, P.; Petrovici, P.; Danicel, G.; Badiu, L.; Vlad, E.; Arizan, D.

*Lucrari de Cercetare, Institut de Cercetari si Proiectari Alimentare* 11, 95-117 (1973) [Ro, en, fr, de, ru]

Studies on gamma-irradiation of (i) canned hams (doses of 0.5, 0.8, 3.0 or 4.5 Mrad, irradiation at ambient temp. or at -5°C) or (ii) hams packaged in 'Darvac' plastics bags (doses of 0.125-3.0 Mrad) are described. (i) Samples were stored for  $\leq 300$  days at ambient temp.; (ii) were stored for  $\leq 50$  days at ambient temp. or at 4°C. At intervals, samples were taken and their organoleptic properties, composition (moisture, fat,  $\text{NH}_3$ , N and protein contents), pH and microbiological quality were evaluated. Tables of results are given. Irradiation impaired the taste and aroma of (i) and (ii); this effect increased with increasing radiation dose. Irradiation in the frozen state gave better results than irradiation at ambient temp. The organoleptic properties of irradiated ham improved during storage. Irradiation markedly improved the microbiological quality of the hams. Optimal irradiation conditions for (i) and (ii) are discussed. The recommended shelf-life for irradiated (i) is 6 months; that for irradiated (ii) is 10 days at ambient temp., or 15 days at 4°C. AJDW





## 52

**[Nitrite changes in canned meat.]**

Cantoni, C.; Cattaneo, P.; Cipolla, M.; Calcinardi, C.

*Industria Alimentari* 14 (5) 87-90 (1975) [17 ref. It, en] [Istituto de Ispezione degli Alimenti di Origine Animale, Univ., Milan, Italy]

0, 150, 300, 600, 1200 or 2400 mg NaNO<sub>2</sub>/kg were added to minced beef, and 200 g samples were sterilized in cans. Values are tabulated for contents (in meat and jelly) of SH groups, free nitrites, nitrates, NO bound to myoglobins and myofibrils, NH<sub>3</sub>, and total volatile basic N. It is concluded that free nitrite contents never exceeded the prescribed max. limits (max. found at 2400 mg/kg addition, 36 mg/kg in meat and 11.1 mg/kg in jelly) and that for colour preservation, ≤150 mg NaNO<sub>2</sub>/kg (legal max.) was best. SKK

## 53

**[Composition and evaluation of meat dishes in gravy.]** Über Zusammensetzung und Beurteilung von Fleischgerichten in Sossen.

Harms, F.

*Archiv für Lebensmittelhygiene* 26 (3) 93-98 (1975) [15 ref. De] [St.

Veterinäruntersuchungsamt, Hanover, Federal Republic of Germany]

The Federal German Food Labelling Regulations in force are considered insufficiently precise to enable satisfactory definition of content of valuable parts in meat dishes in gravy. Change or supplementation of the regulations is urgently advocated. On the basis of tabulated results of analysis of 295 canned meat dishes in gravy from the Hanover area, it is recommended that the initial raw meat content of stewed steak and stewed pickled steak amount to 50% by wt. of total can contents; and that wet muscle content of the canned product be ≥50% of the declared raw meat wt. For minced meat steak, rissoles and the like, it is recommended that the initial proportion of solid components be >50% by wt., and be ≥45% for Königsberg meat balls (Königsberger Klopsen); and that ≥80% of the declared wt. of raw solids be recoverable in the canned product. SKK

## 54

**Can a sensory panel be replaced by an instrument.**

[Lecture]

Sydow, E. von

*IFST Proceedings* 7 (3) 190-192 (1974) [5 ref. En] [Swedish Inst. for Food Preservation Res. (SIK), Gothenburg, Sweden]

Consumer assessment of a food involves different physiological senses which record e.g. appearance, aroma, taste, texture, viscosity, which are transmitted to the brain as an integrated sensory perception. Individual properties are usually measurable by chemical/instrumental

analysis; sensory panels are an attempt to express human response in systematic numerical terms.

Examples are given of mathematical relations used between stimulus S (e.g. analytical measurement) and response R of a panel. Correlations between S and R can be such that S is purely accidental, or predictive or causative of R. A specific example is given of the unpleasant 'retort' or 'tinned' flavour of canned beef. Analyses (gas chromatography and MS) of changes during processing of various recipes at different temp. showed that the unpleasant aroma/flavour was associated with volatiles containing -SH groups and short-chain aliphatic aldehydes; 95 compounds were identified and 6 (named) were studied in detail. High R and S correlation coeff. are demonstrated for the 6 compounds or mixtures; it was further shown that volatiles decreased and odours improved with HTST processing (131°C) or aseptic canning. Instruments can usefully supplement a panel and sometimes replace it; in general both are essential and complementary in quality control. ELC

## 55

**[Rational methods for the manufacture of canned prepared foods.]** Rationelle Methoden zur Herstellung von Fertiggerichtskonserven.

[Lecture] Höll, J. C.; Reichert, J. E.

*Fleischerei* 25 (11) 38-40 (1974) [De, en, fr] [Konserven-Inst. Neumünster, D-235 Neumünster, Kieler Strasse 204, Federal Republic of Germany]

Aspects considered in this paper on canning of meat-based prepared foods include: heat treatment (with special reference to HTST processing); use of rotary autoclaves; use of raw ingredients (which are cooked during retorting); manufacture of sauces (with special reference to emulsification of the fat); and problems of rapid heat transfer in viscous products (with reference to the use of special modified starches). Recipes and processing conditions are given for pea soup, bean soup, lentil soup, white beans with sausages in tomato sauce, meat and vegetable casserole, and green bean casserole. AJDW

## 56

**[Microbiological analysis of the manufacture of meat preserves.]**

Zukal, E.; Fabri, I.; Szekely, K.; Varga, I.

*Konzerv-es Paprikaipar* No. 6, 204-209 (1973) [Hu, ru, de] [Közp. Élelmiszerellenőrző és Vegyvizsgáló Intézet, Budapest, Hungary]

Details are given of microbiological studies conducted during the period 1969-1972 on samples of canned minced meat, creamed liver and stewed beef, manufactured at the Budapest Preserving Factory. Graphs are given of values for the counts of spores and vegetative cells of mesophilic aerobes and anaerobes. Counts were higher in the summer than in the winter, but only by a factor of 10. Stages of the canning process needing special attention to avoid microbiological contamination are discussed. IF





57

[Problems during processing and storage of canned beef. II. Chemical changes in canned beef stored for a long time.] Probleme bei der Herstellung und Lagerung von Rindfleischkonserven

(Vollkonserven). II. Chemische Veränderungen in langlagernden Rindfleischkonserven.

Günther, H. O.

*Zeitschrift für Lebensmittel-Untersuchung und -Forschung* 158 (1) 9-20 (1975) [20 ref. De, en]

[Landesuntersuchungsamt für das Gesundheitswesen Südbayern, Fachbereich Chemie, Aussenstelle Augsburg, Federal Republic of Germany]

Ox meat was cut into pieces, salted, held at 0°C for 1, 4 or 8 days after slaughter and canned in its own juice in 200-g cans, sterilization being at 120°C for 60 min. Samples were examined in 1967-1970, i.e. 1, 2, 3 and 4 yr after processing, by organoleptic evaluation (taste and odour), and by electrophoretic TLC separation of peptides and Sephadex gel filtration and TLC of amino acids and peptides carried out on conc. can content dialysates. Samples of similarly-canned ox meat made in 1958 and 1960 from fresh meat and in 1962 from frozen meat were also examined organoleptically in 1967. Results of examination of the samples are presented in detail, peptide charts obtained by electrophoresis/TLC being reproduced. It is concluded that meat held for 4 days after slaughter was the most suitable for long-term storage after canning, that frozen meat was unsuitable for this purpose, and that changes detected by the procedures named above and particularly in substances staining brown with ninhydrin on the peptide charts, which disappeared during storage, agreed well with results of organoleptic assessment [See FSTA (1975) 7 7S912 for part I.] SKK





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FAB 51

MEAT CANNING

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H. BROOKES

ASSISTANT EDITOR





## 1

[Preserved food can for meat and sausage products, particularly small sausages.] Konservendose zur Aufnahme von Fleisch- oder Wurstwaren, insbesondere Würstchen.

Burkhart, W. (Aromac Nachf. Burkart & Co.)  
*German Federal Republic Patent Application*  
2 351 842 (1975) [De]

A can of small sausages includes a detachable plastics container enclosing mustard. The container is either a flat extension above the can, which is located by means of the roll joint holding the lid, or is slightly tapered and is countersunk in a depression in the lid, and held in place by friction. W&Co

## 2

The RTIA visited to the canning factory Avon et Ragobert "Les Specialites de Sologne" at Nancay. Tiphaine, D.

*RTIA [Revue Technique et Economique de l'Industrie Alimentaire]* 23 (232) 43-49, 51-53 (1975) [Fr, De, En]

The new Avon and Ragobert canning factory specializing in game products is described with details of supply of raw materials, preparation of pates, production, and economic and commercial policy. RM

## 3

The influence of the selection of raw materials on the reheating value of canned meat and lard. A model study.

Wojciechowski, J.; Pezacki, W.  
*Acta Alimentaria Polonica* 1 (2) 145-152 (1975)  
[8 ref. En, pl] [Inst. of Tech. of Food of Animal Origin, Acad. of Agric., Poznan, Poland]

The influence of different raw materials (meat and lard, varying in shape and vol. of their lumps) on the reheating time of canned meat and lard was studied in model conditions. It was demonstrated that the determining factor in reheating dynamics, independent of the type of materials and extent to which they had been comminuted, is the composition of the brine and, consequently, the convection heat exchange and the distance between the geometrical centre of the lump of material and the nearest wall of the tin. Regression formulae defining the sterilization value as a function of selected experimental factors are also given. AS

## 4

[Influence of additives and the heating temperature on some chemical and physical changes in canned meat. I. Alteration of tin and iron contents by corrosion of the can.] Einfluss technologischer Zusätze und des Erhitzungsbereiches auf einige chemische und physikalische Veränderungen von Fleischkonserven. I. Änderung des Zinn- und Eisengehaltes durch Korrosion der Verpackung. Wojciechowski, J.; Pikul, J.; Janitz, W.; Janowska, E.

*Nahrung* 19 (8) 669-682 (1975) [29 ref. De, en, ru] [Inst. für Tech. der Lebensmittel Tierischer Herkunft, Landwirtschaftlichen Akad., Poznan, Poland]

Factors influencing uptake of Fe and Sn by canned cured pork were studied. Variables tested were: additives (none; 0.4 or 0.8% polyphosphate, ascorbic acid or gelatin; 0.4% polyphosphate + 0.4% ascorbic acid + 0.4% gelatin; or 0.8% polyphosphate + 0.8% ascorbic acid + 0.8% gelatin); heat treatment (pasteurization at 82°C or sterilization at 121°C); and storage of the canned product (0, 50, 100, or 300 days at 18-20°C). Tables and graphs of results are given. Sn concn. were highest in both pasteurized and sterilized samples without additives, Fe concn. in sterilized samples without additives were higher than in those with additives; in pasteurized samples, additives had little effect on Fe concn. Of the samples containing additives, the highest Sn concn. were observed in those containing polyphosphates. Immediately after heat treatment, pasteurized samples had a higher Sn content than sterilized samples; sterilized samples tended to reach higher Sn concn. after prolonged storage. Fe concn. in sterilized samples were generally higher than those in pasteurized samples. Fe and Sn concn. increased with increasing storage time. Colour changes in the canned meat agreed quite well with the extent of uptake of Fe and Sn. AJDW

## 5

[Manufacture of canned Weisswurst and other non-smoked sausage types, with an improved shelf-life.] Herstellung von längerfristig haltbaren Weisswurst- und anderen ungeräucherten Brühwurstkonserven. [Lecture]

Reichert, J. E.

*Fleischerei* 26 (4) 59-60 (1975) [5 ref. De]  
[Konserven-Inst. Neumünster, Kieler Strasse 204, D-235 Neumünster, Federal Republic of Germany]

Manufacture of canned Weisswurst and other boiling sausage types is described, with reference to: effects of the recipe on susceptibility to bursting; preparation of the emulsion; the importance of relatively loose filling of the casings; scalding and drying of the sausages; and canning and sterilization conditions. AJDW

## 6

Changes in volatile flavor compounds during the retorting of canned beef stew.

Peterson, R. J.; Izzo, H. J.; Jungermann, E.; Chang, S. S.

*Journal of Food Science* 40 (5) 948-954 (1975)  
[32 ref. En] [Dep. of Food Sci., Rutgers, State Univ. of New Jersey, New Brunswick, New Jersey, New Brunswick, New Jersey 08903, USA]

Significant qualitative and quantitative differences were found in the volatile flavour compounds of canned and fresh beef stew by gas chromatography and sniffing of the chromatograph effluents. A total of 102 compounds was identified in the canned stew volatiles; a number of them for the first time in foods. The principle compounds





identified consisted of saturated and unsaturated aliphatic hydrocarbons, saturated cyclic hydrocarbons, aromatic hydrocarbons, alcohols, aldehydes, ketones, furan compounds and N/S-containing compounds. It was established that the retort flavour of canned stew is not due to a single compound but is probably due to a relatively complex mixture of a number of components which might include oxygenated furan derivatives, some heterocyclic compounds, such as benzothiazole and pyrroles, and some low mol. wt. S compounds, such as  $H_2S$  and dimethyl sulphide. IFT

## 7

[Production statistics of the meat processing industries in the USSR in 1974.]

Esin, N.

*Myasnaya Industriya SSSR* No. 3, 15-16 (1975)

[Ru] [Min. Myasnoi i Molochnoi Promyshlennosti, USSR]

1974 production figures ('000 t) are as follows: meat 8420.0, poultry 381.3, meat products 2681.0, edible fats 367.6, and tinned meats 793.3. STI

## 8

[The exploitation of over-pressure during heat processing of cans of pasteurized meat.]

Stamenkovic, T.; Satovic, V.; Loncar, A.; Tisljarec, D.

*Tehnologija Mesa* 16 (2) 38-41 (1975) [16 ref.

Sh, en] [Jugoslovenski Inst. za Tehn. Mesa, Belgrade, Yugoslavia]

Differences between heat-treatment of canned meat products with and without pressurization of the autoclave are discussed. Internal pressure in the can increases during pasteurization regardless of prior mechanical processing of the meat. This interior pressure enhances heat conduction, which is reflected in the amount of jelly separated, and the water binding capacity, consistency, colour and juiciness of the product. Pressurization of the autoclave reduces juice separation by 2.61% and reduces the consistency score of the meat. Results of analysis of the meat products agreed well with organoleptic properties. STI

## 9

[Incidence of mesophilic bacterial spores in raw meat used in canned meat manufacture in Japan, and comparative study of a differential method for *Clostridium* and *Bacillus* spore counts.]

Matsuda, N.; Matsumoto, N.; Ushizawa, S.; Kakegawa, Y.

*Journal of the Food Hygienic Society of Japan*

[*Shokuhin Eiseigaku Zasshi*] 16 (2) 99-104 (1975)

[9 ref. Ja, en] [Res. Lab., Cannery Assoc. of Japan, 460 Kariba-cho, Hodogaya-ku, Yokohama, Japan]

Bacterial spores were determined in samples of raw meat from canning plants, using the anaerobic pouch method with modified Angelotti agar, and by the tube method (MPN detn.) using differential reinforced *Clostridium* medium. *Clostridium* spore counts were low; more than 50% of samples

contained no *Clostridium* spores. Mean counts of *Bacillus* spp. spores were 10-100/g in frozen meat and 100-1000/g in thawed meat. No toxigenic *Clostridium* were detected in any sample. TM

## 10

[Evaluation of functioning of an autoclave used in the meat industry.]

Wojeiechowski, J.; Poplawska, M.; Panowicz, Z.; Pezacki, W.

*Gospodarka Miesna* 26 (2) 20-23 (1974) [6 ref. Pl]

The functioning was tested of an industrial horizontal single-chamber autoclave with steam inlets in the lower part and max. pressure of 4.5 atm. intended for sterilization of cans of meat. The results are tabulated or graphically presented in detail. Differences in heating and cooling rates and in max. temp. achieved in different parts of the autoclave are stressed as well as the resultant variability of degree of sterility achieved, and canned meat quality. SKK

## 11

Low-temperature irradiation of beef and methods for evaluation of a radappertization process.

Anellis, A.; Shattuck, E.; Rowley, D. B.; Ross, E. W., Jr.; Whaley, D. N.; Dowell, V. R., Jr.

*Applied Microbiology* 30 (5) 811-820 (1975) [52 ref. En] [Food Sci. Lab., US Army Natick Development Cent., Natick, Massachusetts 01760, USA]

An inoculated, irradiated beef pack (1240 cans) study was conducted for detn. of microbiological safety. Each can contained a mixture of  $10^6$  spores of each of 10 strains of *Clostridium botulinum* (5 type A and 5 type B), or a total of  $10^7$  spores/can. Cans were irradiated to various doses (100 cans/dose) with  $^{60}Co$  gamma rays at  $-30 \pm 10^\circ C$ , incubated at  $30 \pm 2^\circ C$  for 6 months, and examined for swelling, toxicity, and recoverable botulinal cells. Min. experimental sterilizing dose based on nonswollen, nontoxic sterile cans was 2.2 below the experimental sterilizing dose of  $\leq 2.6$  Mrad. Using recoverable cells as the most stringent criterion of spoilage, and assuming the conventional simple exponential (without an initial shoulder) rate of spore kill, the 12D dose was 3.7 Mrad when estimated on the basis of a mixture of 10 strains totalling  $10^7$  spores/can, and 4.3 Mrad if it is assumed that each can of beef contained  $10^6$  spores of a single most resistant strain and all of these spores were of identical resistances. However, analysis of data by extreme value statistics indicated with 90% confidence that spore death rate was not a simple exponential but might be a shifted exponential (with an initial shoulder), Weibull, lognormal, or normal, with a 12D equivalent of about 3.0 Mrad regardless of initial spore density/can. There was an apparent antagonism between irradiated type A and B strains in cans. Some cans contained type B toxin but did not include type B viable cells. Other cans had a





mixture of type A and B toxins, but a large number of these cans did not yield recoverable type B cells. However, type A viable cells could always be demonstrated in cans containing type A toxin AS

## 12

[Experience with using aluminium in food industry.] Zaputovic, V.; Djonlija, D.

*Tehnologija Mesa* 15 (12) 381-383 (1974) [Sh, en] [Metalografski Kombinat, Rijeka, Yugoslavia]

A report is given of a research on the effect of meat and fish products on the quality of tinfoil and aluminium cans. The latter were found more suitable on the basis of the organoleptic properties of the products, internal corrosion and the possibility of using easy-to-open closures. STI

## 13

[Effect of soybean preparations in canned meat on internal can corrosion.]

Djordjevic, G.; Jakasa, K.; Simic, N.; Milanovic, M. *Tehnologija Mesa* 15 (12) 384-386 (1974) [4 ref. Sh] [Jugoslavenski Inst. za Tehnologiju Mesa, Belgrade, Yugoslavia]

The product tested was luncheon meat to which a soybean preparation was added to enhance the content of essential proteins. Three preparations were studied (soybean grits, soybean flour, and isolated soybean protein), and the cans used were 73 × 50 mm, made from tinfoil (with and without an epoxy-phenolic varnish coating, and with and without addition of Al pigment). The soybean preparations were first tested alone; they were mixed with water (1:3), enclosed in the cans and sterilized for 40 min at 118°C. A 2nd test series was conducted on cured comminuted meat containing 3.5% soybean preparation. The soybean flour and grits made the tin coating much thinner, producing stains; the isolated protein caused only staining. The cans with the luncheon meat were corroded to such a degree that an inner coating of epoxy-phenol varnish with addition of Al pigment is recommended. STI

## 14

[High-calorie meat/fat products preserved in small cans.]

Kundin, P. V.; Sterlikova, N. P.

*Trudy, Vsesoyuznyi Nauchno-issledovatel'skii Institut Konservnoi i Ovoshchesushil'noi Promyshlennosti* No. 19, 63-65, 123 (1973) [Ru] [VNIKOP, Moscow, USSR]

Recipes and protein, fat, and carbohydrate contents, and calorie values are tabulated for 100-g portions of dried cooked meat (DCM) with fat (70% DCM, 28% hydrogenated fat or lard, 1% sodium glutamate and 1% salt), DCM with butter (70% DCM, 28% rendered butter, glutamate and salt as above) DCM with salted pig fat (50% DCM, 49% dried fat, 1% sodium glutamate), or DCM with fat and dried egg (60% DCM, 25% hydrogenated fat, 13% dried egg powder, glutamate and salt 1% each). The portions, packaged in 100-g cans, were heated to

100°C for 20/15/20 min; stored under ambient conditions, they retained their initial quality for 24 months. The products, intended for tourism, expedition purposes, may be mixed with a little water and used as spread on bread or biscuit, or may be made into soup. SKK

## 15

[Canned meat products.]

Morev, N. E.; Afanas'yeva, E. S.; Pavlova, N. L. *Trudy, Vsesoyuznyi Nauchno-issledovatel'skii Institut Konservnoi i Ovoshchesushil'noi Promyshlennosti* No. 19, 54-58, 122 (1973) [Ru] [Vses. Nauchno-issled. Inst. Myasnoi Promyshlennosti, Moscow, USSR]

Recipes (% of 4-11 components) and contents of moisture, protein, fat, carbohydrate, ash, K, Ca, Mg, P, Fe, carotene, vitamin A, thiamin, riboflavin, nicotinic acid and ascorbic acid, and calorie values are tabulated for canned rib of beef, pork-fillet carbonnade, chicken, small frankfurters, chopped bacon-pig meat, jellied pork, jellied beef tongue, meat in white sauce, fried liver, pork or beef goulash, pork 'solyanka' (with cabbage and vegetables), meat with buckwheat groats; and meat with pearled barley. Storage life is 12 months at 22 ± 3°C. SKK

## 16

[Effect of the heating medium during sterilization on the quality of external surfaces of cans.]

Djordjevic, G.; Simic, N.; Popov, V.

*Tehnologija Mesa* 15 (12) 379-380 (1974) [4 ref. Sh, en] [Jugoslavenski Inst. za Tehnologiju Mesa, Belgrade, Yugoslavia]

The surface of tinfoil cans is impaired due to the effects of the water-steam-water sequence; these agents were tested with cans 73 mm in diam. and 40 mm in height, designed to hold luncheon meat. The cans were either lithographically labelled, or label-free. Sterilization for 30 min at 120°C was carried out in 4 types of water medium, differing considerably in chemical composition. Alkaline waters, acting harmfully on tinfoil and protective coatings, were given special attention. Calcium-, magnesium- and iron-rich water is not recommended due to the formation of deposits on the can surface; these deposits may produce corrosion due to hygroscopic effects. STI

## 17

[Study of the accuracy of a ham canning machine.] Rojas, C. V.

*Revista del Instituto de Investigaciones Technologicas* 17 (94) 31-42 (1975) [3 ref. Es]

Statistical methods used for wt. control of ham canning are described with the aid of examples; e.g. detn. of the SD of mean gelatine and meat contents, detn. of the limits of the process, and long-term variations. Examination of 30 samples showed mean meat content of 414.7 g, 9.35 and mean gelatine content 42.7 g, SD 3.23, i.e. mean total not contents of 457.4 g, SD 9.9 g. The SD is well below that permitted by US canned meat inspection





regulations. The process limits were calculated by means of control cards showing mean and order of values, and allowing calculation of the % of total production outside the tolerance limits. RM

## 18

[Specific distribution and heat resistance of mesophilic bacterial spores isolated from frozen raw meat used in canned meat manufacture.] Matsuda, N.; Matsumoto, N.; Ushizawa, S.; Kakegawa, Y.; Kato, H.; Nishida, S. *Journal of the Food Hygienic Society of Japan [Shokuhin Eiseigaku Zasshi]* 16 (4) 253-257 (1975) [10 ref. Ja, en] [Res. Lab., Canner's Ass. of Japan, Kariba-cho, Hodogaya-ku, Yokohama, Japan]

## 19

[The automation of heat processing of canned meat products in a vertical autoclave.] In 'Scientific meeting to celebrate 20th anniversary of the Bulgarian Socialist Republic' [see FSTA (1976) 8 6S857.] [Lecture] Mangarudov, I. R. pp. 88-91 (1974) [Bg]

An automated system for sterilization and pasteurization of canned meat products in vertical autoclaves is described; data obtained during operation of this system are given. Temp. may be automatically controlled over the range 50-150°C; pressure may be controlled over the range 0-5 kg/cm<sup>2</sup>. Processes may be programmed for periods of 1 min-6 h, with automatic control of the individual phases of the process. STI

## 20

[The technology of the production of blood plasma for meat industry purposes.] In 'Scientific meeting to celebrate 20th anniversary of the Bulgarian Socialist Republic' [see FSTA (1976) 8 6S857.] [Lecture] Rusev, I.; Tomov, N.; Danchev, M.; Nedyalkov, V. pp. 152-159 (1974) [Bg]

Methods and equipment for production of blood

plasma for use in the food industry are discussed. A new development is sterilization of the plasma by filtration; the resulting product meets hygienic requirements. Experiments were conducted on the use of frozen blood plasma (added at levels of ≤10%) in salami and canned meat products. Addition of blood plasma improved the stability and nutritional value of the products. STI

## 21

[Suitability of white Zlotniki pigs for canned ham manufacture.]

Domanski, J.; Maruniewicz, W.; Walkowiak, T. *Gospodarka Miesna* 27 (10) 26-29 (1975) [Pl]

(i) slaughter data and (ii) meat quality characteristics (moisture and fat contents, pH, water absorption capacity, loss on cooking and fat content of backfat) are tabulated for groups of 50 for (i) and 25 for (ii) castrated male and 50 for (i) and 25 for (ii) female white Zlotniki pigs from each of 2 breeding stations slaughtered at 103-125 kg body wt. Overall mean values with SD include: slaughter yield 74.4 ± 2.7%, backfat thickness at 5 sites 27.1 ± 5.1 mm, fat content of meat 1.6 ± 0.6%, and loss on cooking 26.7 ± 4.3%. Mean dissection values for 61 hams were: total meat 69.8%, canning meat 39.2% (vs. 30-34% taken as standard for Polish production), skin + subcutaneous fat 18.7%, and bones 11.5%. It is concluded that Zlotniki pigs are suitable for canned ham manufacture; further selection for meatiness is recommended. SKK

## 22

[Colour indicators of heat treatment conditions of canned meat.]

Kocot, M.; Adamczyk, E.; Jaremko, M.; Mielnik, J. *Gospodarka Miesna* 27 (7/8) 18-21 (1975) [6 ref. Pl]

The performance of 'Cook-Chex' colour indicators manufactured by the Aseptic-Thermo Indicator Company, California, USA for placing in the autoclave alongside a can-batch and said to be compulsory in some countries exporting canned meat to the USA for checking correctness of sterilization process, was studied under different time/temp. (temp. 37°, 85°, 95° or 100°C) conditions and also at different pH (7-10) of the heat transfer medium. It is concluded from tabulated and graphically presented results that colour change of the 'Cook-Chex' indicators was determined not only by time and temp., but also by pH of the medium; that they were not an objective indicator of heat treatment conditions in meat canning; and that great care should be exercised in the use of any colour indicators in meat canning. SKK

## 23

Radiation sterilization of prototype military foods: low-temperature irradiation of "wholesomeness" beef.

Anellis, A. A.; Shattuck, E.; Rowley, D. B.; Whaley, D.

*Abstracts of the Annual Meeting of the American Society for Microbiology* 74, 17 (1974) [En] [US Army Natick Lab., Natick, Massachusetts, USA]

An inoculated pack study comprising 1000 cans was performed on 'wholesomeness' beef. Each can contained a mixture of 10<sup>6</sup> spores of each of 10 strains of *Clostridium botulinum* (5 type A and 5 type B), or a total of 10<sup>7</sup> spores. The cans were





irradiated to various doses (100 cans/dose) with  $^{60}\text{Co}$   $\gamma$ -rays at  $-30 \pm 10^\circ\text{C}$ , incubated for 6 months at  $30^\circ\text{C}$ , and examined for swelling, toxicity and recoverable *Cl. botulinum*. The minimal experimental sterilizing dose (ESD) based on nonswollen, nontoxic sterile cans was  $2.2 < \text{ESD} \leq 2.6$  Mrad. The '12D' dose, assuming exponential spore death, was 3.7 Mrad based on recoverable cells. However, an analysis of the data by Extreme Value statistics, using the Weibull distribution [which encompasses the exponential (with slope,  $\beta$ , of 1.0) as well as other distributions], indicated with about 90% confidence that the spore death rate was not exponential, since  $\beta$  was 2.03. The '12D' equivalent dose for a possible Weibull, normal or log normal death rate computed to 2.9, 2.9 and 3.0 Mrad, respectively. AS

## 24

[Determination of the sterilization value of canned meat from tables.] Tabellarische Methode zur Bestimmung des Sterilisationswertes für Fleischkonserven.

Wojciechowski, J.; Harabasz, J. S.

*Fleischwirtschaft* 56 (2) 255-258 (1976) [12 ref. De, en, fr] [Inst. für Tech. der Lebensmittel Tierischer Herkunft, Landwirtschaftliche Akad., Mazowiecka 48, 60-623 Poznan, Poland]

A method of determining the F value in canned products heated by thermal conduction is described. Assuming that the rate of temp. increase is proportional to the difference in temp. between the autoclave and the core of the canned product, an equation of the function meeting this condition and representing the temp. change in the canned product with time was derived. Using this function, tables for F values were worked out for a number of variants of the sterilization process. From these tables the F value for actual sterilization can be determined by means of 3 known points on the temp. curve. The process ensuring best product quality can be selected from among the many variants of the sterilization process that give the same F value. AS

## 25

[Quality changes in canned meat with vegetables or cereals during prolonged storage.] (In 'Sovershenstvovanie khraneniya tovarov narodnogo potrebleniya v torgovle.') [Book]

Montitskii, R. I.; Gunitskaya, E. A.; Ivleva, Z. P.; Plestsova, N. S.

pp. 73-83 (1974) [2 ref. Ru] [Moscow, USSR; Vsesoyuznyi Nauchno-issledovatel'skii Institut Ekonomiki Torgovli i Sistem Upravleniya]

A total of 17 batches (31 740 cans) of canned rice or buckwheat or pearled barley porridge with beef, mutton or pork, or of peas and macaroni with beef or pork from 3 canning factories were stored in ordinary (temp. range,  $-5^\circ$  to  $20^\circ\text{C}$ ) or refrigerated stores (temp. range,  $0-5^\circ\text{C}$ ) in Moscow, Leningrad and Tashkent for  $\leq 2$  yr. Changes in contents of amino and ammonia N, Sn, total acidity and acid value of fat, and in organoleptic score are tabulated or graphically presented. It is concluded

that storage quality of canned meat with vegetables or cereals deteriorates much more rapidly than that of canned meat alone; that the storage life under best storage conditions ( $0-5^\circ\text{C}$  and  $\leq 75\%$  RH) is 18 months; that storage changes were similar in internally lacquered and unlacquered cans; that externally lacquered cans are preferable; and that meat/porridge-type products kept relatively better, buckwheat porridge with beef being best in this respect. Brief guidelines on canning and sales practices are given. SKK

## 26

[Changes in the lipid components of meat preserves under influence of heat treatment. I. Oxidative and hydrolytic changes in pork meat preserves.]

Manev, G.; Bliznakova, L.

*Khranitelna Promishlenost* 23 (4) 14-16 (1974)

[10 ref. Bg, de, en]

Diced pork meat (50% fat) and pure rib fat (both 3-mm cubes) were filled into 140-g lacquered cans which were vacuum sealed, and then heated at  $72^\circ$ ,  $82^\circ$ ,  $110^\circ$  or  $121^\circ\text{C}$  for 60 min; unheated samples served as controls. The effects of the heat treatment on the lipid components of the samples, obtained by cold extraction with ethyl ether, were determined on the basis of the contents of free fatty acids; analyses were by iodometric, refractometric and absorption spectrophotometric methods, as well as organoleptically (taste, consistency, odour). On the basis of the results, given in tabular and graph form, it is concluded that variations in the heating temp. within the range studied had no major effect on the oxidative and hydrolytic changes in the meat lipids. HBr

## 27

Effects of polyphosphates on the flavor volatiles of poultry meat.

Rao, C. S.

*Dissertation Abstracts International, B* 36 (7)

3295: Order No. 76-844 (1976) [En] [Mississippi State Univ., Starkville, Mississippi, USA]

The effect of polyphosphate treatment on the volatile flavour components, amino acid composition, and protein and sulphhydryl contents of cooked poultry meat and on canned samples over a storage period of 9 months was studied. Untreated meat served as controls. Polyphosphates enhanced the meaty aroma of canned meat.  $\text{H}_2\text{S}$  and methyl mercaptan concn. were higher in treated samples than in controls, the concn. being proportional to the amount of polyphosphate added. Carbonyl,  $\text{NH}_3$  and malonaldehyde concn. were lower in treated samples than in controls. Conc. of  $\text{H}_2\text{S}$ , methyl mercaptan and saturated and total carbonyls altered slightly during storage of control and treated samples. Conc. of unsaturated carbonyls in controls increased during storage. Polyphosphates retarded increases in  $\text{NH}_3$  content and thiobarbituric acid values during storage. During cooking, polyphosphates significantly ( $P < 0.01$ ) increased the yield of S-containing volatiles and decreased the carbonyls. 5





major carbonyl volatiles were significantly ( $P < 0.05$ ) decreased by the addition of polyphosphates. The protein content of cooked chicken broth increased with polyphosphate addition, the reverse was found for sulphydryl groups. JA

## 28

[Routine methods of examination for meat and meat products. XI. Determination of the drip loss (drained weight) of jelly from canned cooked meat and brawn. Determination of the % free fat, pure gelatin and jelly.] Routine-

Untersuchungsmethoden für Fleisch und Fleischwaren. XI. Bestimmung des Abtropfgewichtes bei geleehaltigen Konserven aus gekochtem Fleisch und bei Fleischsülzen. Ermittlung des Gehaltes an freiem Fett und an reiner Gelatine sowie des Gelee-Anteiles. Wyler, O. D.

*Fleischwirtschaft* 56 (2) 202-203 (1976) [De] [CH 3028 Spiegel bei Bern, Erlenweg 8, Switzerland]

Drained wt. of canned meats and meat products is determined by mincing the cooled product (at 5°C) and allowing jelly and fat to drain through a sieve into boiling distilled water. The residu given an approx. measure of the lean meat. Free fat is determined by quantitative extraction from the drained solution into trichloroethylene and jelly content calculated by difference. Gelatin in the aqueous solution is determined by the Kjeldahl method using the factor  $N \times 5.55$ . [See FSTA (1973) 5 2S191 for part X.] RM

## 29

Changes in the lipid component of canned pork products under the influence of heat treatment. [Lecture]

Manev, G.; Bliznakova, L.

*Proceedings of the European Meeting of Meat Research Workers* 19 (Part II) 861-870 (1973) [9 ref. En, ru, fr, de] [Meat. Tech. Res. & Project Inst., Sofia, Bulgaria]

Effects of heat treatment (in 140-g cans) for 60 min at 72°, 82°, 110° or 121°C on the lipids in minced pork (50% fat) and minced porcine kidney fat were studied. Tables and graphs of results are given. No significant effect of treatment temp. on organoleptic properties, refractive index or acid value were observed. In kidney fat samples, oxy group concn. increased with increasing processing temp.; no significant effects of processing temp. concn. on the oxy group concn. of pork were observed. Changes in the UV absorption spectrum paralleled changes in oxy group concn. [See FSTA (1976) 8 9S1589.] AJDW

## 30

Comparative histologic study on local and imported luncheon meats in Greece. [Lecture]

Rantsios, A.

*Proceedings of the European Meeting of Meat Research Workers* 19 (Part II) 645-651 (1973) [9 ref. En, de, fr]

33 cans of luncheon meat (14 imported, 19 produced in Greece) were examined histologically, to evaluate compliance with Greek legislation prohibiting the use of skin, mammary glands, offal, etc. in this product. Concn. of connective tissue, muscle tissue and other materials (including starch) in the samples were also determined. Overall, only 28.4% of imported samples and 10.6% of Greek samples were free from the prohibited tissues; 35.5% of imported samples and 37.1% of Greek samples contained >1 prohibited tissue. On average, the imported samples contained 85.14% connective tissue, 1.88% muscle tissue and 12.86% starch, etc.; corresponding values for Greek samples were 85.97%, 3.90% and 8.97%, respectively. [See FSTA (1976) 8 9S1589.] AJDW

## 31

Growth and activity of *Str. faecalis* isolated from pasteurized canned meats and changes in them after radurization with different doses of gamma rays. [Lecture]

Stoychev, M.; Djejeva, G.; Dimitrova, N.; Brankova, R.

*Proceedings of the European Meeting of Meat Research Workers* 19 (Part III) 1047-1057 (1973) [14 ref. En, ru, fr, de] [Meat Tech. Res. & Project Inst., Sofia, Bulgaria]

Pressed pork was inoculated with *Streptococcus faecalis* ( $10^5$  cells/g), packed in 300-g cans and pasteurized to a core temp. of 65.5°C for 30 min. Some of the pasteurized samples were  $\gamma$ -irradiated (0.5 or 0.2 Mrad); others were not irradiated. The samples were then stored at room temp. or at 2-4°C for  $\leq 6$  months. At intervals, the microbiological quality, catalase and peroxidase activity, and organoleptic properties of the stored samples were evaluated. The results show that both pasteurization and irradiation retarded the growth of *Str. faecalis*. Refrigerated storage gives less *Strep. faecalis* growth than storage at room temp. Non-irradiated samples stored at 2-4°C had the best organoleptic properties. Irradiation at 0.2 Mrad caused an off-flavour in the product. [See FSTA (1976) 8 9S1589.] AJDW

## 32

A rationale for the safety of canned shelf-stable cured meat: protection = destruction + inhibition. [Lecture]

Pivnick, H.; Petrasovits, A.

*Proceedings of the European Meeting of Meat Research Workers* 19 (Part III) 1081-1096 (1973) [17 ref. En, fr, de, ru] [Food Res. Lab., Health & Welfare Canada, Ottawa, Canada]

Evaluation of the safety of canned cured meat (which has received a mild heat treatment) on the basis of the concept protection = destruction + inhibition is described, together with the use of this concept to evaluate inhibitory effects of various additives. The significance of various inhibitory agents (NaCl, nitrite, nitrite reaction products, etc.) in meat products is discussed. [See FSTA (1976) 8 9S1589.] AJDW





## 33

On thermolysis of meat proteins. [Lecture]  
Mihalvi, V.; Zukal, F.; Kormendy, L.  
*Proceedings of the European Meeting of Meat  
Research Workers* 19 (Part III) 1143-1149 (1973)  
[2 ref. Hu]

Purified pork semimembranosus muscle protein gel samples were heated in sealed cans for 7.5-45 h at 120°C; the water-soluble material concn., the concn. of various N fractions and the amino acid compositions of the heated samples were determined. Tables of results are given. The results show that % water-soluble material, % trichloroacetic acid-soluble N, % alcohol-soluble N, and % amino acids in the alcohol-soluble fraction increased and the % alcohol soluble peptides decreased with increasing heating time. [See FSTA (1976) 8 9S1589.] AJDW

## 34

The utilization of some protein additives and phosphates to improve the technology for canned comminuted meats. [Lecture]  
Graf, V. A.

*Proceedings of the European Meeting of Meat-  
Research Workers* 19 (Part III) 1355-1394 (1973)  
[En, Ru, de] [Vses. Nauchno-issled. Inst. Myasnoi  
Promyshlennosti, USSR]

Studies on effects of added starch, phosphates, sodium caseinate, blood serum or soya protein on various characteristics of canned comminuted beef/pork products are described, together with studies on effects of curing the meat after comminution, and holding the product for approx. 6 h (to allow reconstitution of structure) before sterilization. Tables and graphs of results are given for various characteristics (pH, protein solubility, water-binding capacity, stickiness, plastic viscosity, shear stress) of the products. On the basis of these studies, a continuous process for manufacture of comminuted meat products was developed. [See FSTA (1976) 8 9S1589.] AJDW

## 35

[Chicken stew.]  
Bulgaria, Komitet po Kachestvoto,  
Standartizatsiyata i Metrologiyata  
*Bulgarian Standard* BDS 12687-75, 7pp. (1975)  
[Bg]

The standard applies to a canned product comprising 25% chicken and 75% vegetables (primarily tomatoes, onions, parsley and paprika); the tolerance is  $\pm 5\%$ . The product shall contain 6-8% fat, 0.8-1.5% cooking salt,  $\leq 10$  mg/kg Cu,  $\leq 100$  mg/kg Sn,  $\leq 0.3$  mg/kg Pb; there is no tolerance for pathogenic or anaerobic microorganisms, yeasts, moulds, or vegetative aerobic sporeformers or facultative anaerobes. The standard also covers sampling, packaging, storage (shelf life 24 months at  $\leq 18^\circ\text{C}$ ) and transport. HBr

## 36

[Determination of optimal sterilization parameters for selected canned products. III. Parameters for sterilization of canned vegetable/meat and meat foods.]

Kosewska, L.; Lipowski, J.  
*Prace Instytutów i Laboratoriów Badawczych  
Przemysłu Spożywczego* 25 (2) 241-260 (1975)  
[15 ref. Pl, ru, en, de] [Inst. Przemysłu  
fermentacyjnego, Warsaw, Poland]

The canned foods investigated were beef goulash with macaroni, meat and peas, and a 'tourist type' product. Tests covered microbiological analysis, post-pasteurization contamination, organoleptic evaluation, heat penetration in a WAA-6 autoclave and the sterilization effect at a water temp. of 123°C; a theoretical calculation of the sterilization time was also made. The optimal sterilization conditions were calculated on the basis of microbiological and organoleptic evaluation of the products after storage for 2 months. [See FSTA (1974) 6 9J270 for part II.] STI

## 37

[Effects of processing conditions on the quality of semi-preserved canned products.]

Banu, C.  
*Revista de Cresterea Animalelor* 25 (1) 88-91  
(1975) [Ro] [Fac. de Ind. Alimentara, Inst.  
Polytechnic, Galati, Romania]

Aspects considered in the discussion of factors influencing the quality of semi-preserved canned pork products include: raw material quality; transport and slaughter of the swine; cooling of the carcass; curing and kneading of the meat; and pasteurization of the canned product. The significance of the added water and total added material concn. for the quality of canned pork products is discussed; formulae for calculation of the concn. of these ingredients are given. AJDW

## 38

[Studies on some strains of *Bacillus cereus* isolated from foods.]

Korn, R.  
*Revista de Cresterea Animalelor* 25 (3) 79-86  
(1975) [15 ref. Ro, en, fr, ru] [Lab. Cent. pentru  
Controlul Alimentelor de Origine Animala,  
Bucharest, Romania]

*Bacillus cereus* isolates from semi-preserved canned ham were compared with *B. cereus* Ford 13, *B. cereus* var. *mycoides* 5640 and *B. megaterium* Bira 2. Tables are given for various cultural, morphological and biochemical characteristics of these strains. The results show that the isolate from the ham closely resembled *B. cereus* Ford 13, but not *B. cereus* var. *mycoides* 5640 or *B. megaterium* Bira 2. Comparative studies were conducted on 2 rapid tests for *Bacillus* spp.: incubation for 18 h at 45°C in MYP medium, or incubation for 18 h at 35°C in MYP medium + 5% NaCl; both gave clear differentiation between *B.*





cereus, *B. mycoides* and *B. anthracis*, and permitted detection of low levels of contamination of foods with *B. cereus*. AJDW

### 39

[Effects of various strains of microorganisms on biochemical and organoleptic properties of canned Vetchina ham manufactured according to an accelerated technology.] [Lecture]

Gorbatov, V. M.; Mikhailova, A. E.; Marushkina, V. I.; Mikhailova, M. M.; Ludanova, N. V.

*Proceedings of the European Meeting of Meat Research Workers* No. 20, 108-110 (1975) [4 ref. Ru, en, de, fr] [Vses. Nauchno-issled. Inst. Myasnoi Promyshlennosti, USSR]

Effects of various strains of lactic and denitrifying bacteria (mainly isolated from curing brines) on the quality of canned Vetchina ham were studied. Tables of results are given for the colour, aroma, consistency, taste, overall organoleptic score and volatile fatty acid, lactic acid, free amino acid and carbonyl compound contents of the ham. The results show that use of selected starter strains increases the concn. of flavour compounds and significantly improves the organoleptic properties of Vetchina ham. [See FSTA (1976) 8 10S1831.] AJDW

### 40

Influence of mechanical treatment of cured muscles on some characteristics of pasteurized canned pork. [Lecture]

Rahelic, S.; Pribis, V.; Vicevic, Z.

*Proceedings of the European Meeting of Meat Research Workers* No. 20, 133-135 (1975) [5 ref. En, fr, de, ru] [Fac. of Tech., Univ., Novi Sad, Yugoslavia]

Porcine biceps femoris muscles were cured by injection of 10% brine, then subjected to mechanical treatment by (i) stirring in a container for 2 10-min periods/h for  $\leq 24$  h, or by (ii) tumbling in a drum for  $\leq 360$  min. After mechanical treatment, the hams were canned and pasteurized. The vol. of juice released, tenderness and pH of the canned product were determined; samples treated by method (ii) were histologically examined. Graphs and photomicrographs of results are given. The results show that treatment by method (i) for a total stirring time  $\leq 320$  min decreases juice release and increases tenderness; treatment for longer periods results in an increase in juice release and a decrease in tenderness. No effect on pH was observed. Effects of (ii) followed a similar pattern. Swelling and loosening of the muscle tissue and breakage of muscle fibres were observed during (ii) treatment. [See FSTA (1976) 8 10S1831.] AJDW

### 41

[Changes in canned poultry meat during storage.] [Lecture]

Gonotskii, V. A.; Lobzov, K. I.; Lomaeva, T. I.; Khlebnikov, V. I.

*Proceedings of the European Meeting of Meat Research Workers* No. 20, 196-199 (1975) [9 ref.

Ru, en, de, fr] [Vses. Nauchno-issled. Inst. Myasnoi Promyshlennosti, USSR]

Changes in 6 canned poultry products (in non-lacquered cans, not packaged under vacuum) during storage for  $\leq 3$  yr at 0-4°C or 10-25°C were studied. Tables and histograms of results are given. Deterioration of organoleptic properties, uptake of Fe and Sn, lipid degradation and increases in  $\alpha$ -amino N concn. were observed during storage, changes in samples held at 0-4°C being less than in samples stored at 10-25°C. It is concluded that canned poultry products have a shelf-life of  $\leq 2$  yr at 10-25°C, or  $\leq 2.5$  yr at 0-4°C. [From En summ.] [See FSTA (1976) 8 10S1831.] AJDW

### 42

Utilization of chromium-plated steel cans in canned meat production. [Lecture]

Simic, N.; Djordjevic, G.

*Proceedings of the European Meeting of Meat Research Workers* No. 20, 202-204 (1975) [En, fr, de, ru] [Yugoslav Inst. of Meat Tech., Belgrade, Yugoslavia]

Comparative storage trials were conducted with 4 meat products (cured minced pork, cured pork pieces, cured beef pieces, and pork with sauerkraut), canned in either (i) tinplate, or (ii) Cr-plated steel cans. 3 types of (i) and (ii) cans were tested: non-lacquered; non-pigmented epoxyphenolic lacquer-coated; and Al-pigmented epoxyphenolic lacquer-coated. The canned meat products were tested after holding at room temp. for  $\leq 48$  months (products in non-lacquered cans being tested after  $\leq 12$  months). Tables and histograms of results are given for Cr, Sn and Fe concn. in the meat products and undesirable changes in the can surfaces. It is concluded that lacquered (ii) cans are suitable for use with meat products; non-pigmented lacquers are recommended. Cr concn. in the canned product were no higher with (ii) than with (i); however, products in (ii) cans had higher Fe concn. than those in (i) cans. [See FSTA (1976) 8 10S1831.] AJDW

### 43

[Physical guidelines for meat technology. IV. 9. Canned meat.] Physikalische Richtwerte für die Fleischtechnologie. IV. 9. Fleischkonserven. Wirth, F.; Leistner, L.; Rödel, W. *Fleischwirtschaft* 55 (12) 1698-1700, 1703-1706, 1708-1710 (1975) [De] [Bundesanstalt für Fleischforschung, 8650 Kulmbach, Federal Republic of Germany]

The microbiology, technology and optimal conditions for manufacture of canned meat for short, medium, long and tropical storage are discussed. Technical points discussed include effects of the degree of comminution, size of cans, heating installation, HTST process, temp. and pressure conditions (including vacuum), and static or rotary autoclaves. Numerous data are shown in tables. [See FSTA (1976) 8 7S1058 for part III.] RM





## 44

[Reduction of the nitrite content of meat products during storage.]

Erlandsson, G. B.; Fuchs, G.; Nilsson, G.

*Var Föda* 26 (8) 218-222 (1974) [7 ref. Sv, en]

[Dep. of Microbiol., Agric. Coll., S-75007 Uppsala, Sweden]

Samples of sausage meat containing 2.5% NaCl, 200 mg ascorbic acid/kg and 0, 100, 150 or 200 mg nitrite/kg were canned, pasteurized, and stored at 5°, 10° or 15°C for ≤20 days. At intervals, samples were analysed for residual nitrite. Graphs of results are given. Nitrite concn. decreased sharply shortly after mixing with the sausage meat, then increased slightly during pasteurization. Nitrite concn. then decreased slowly, the rate and extent of the decrease increasing with increasing storage temp. Residual nitrite levels were low (only 2-40% of the initial level). AJDW

## 45

[Aerobic bacteria in pasteurized canned meat.]

Dzolja, D.; Jovanovic, O.; Despotovic, L.

*Tehnologija Mesa* 16 (4) 101-104 (1975) [1 ref. Sh]

[Jugoslavenski Inst. za Tehnologiju Mesa, Belgrade, Yugoslavia]

Aerobic, spore-forming thermophilic organisms (bacilli, streptococci, micrococci, lactic acid bacteria) may be responsible for spoilage of pasteurized meat products (as a result of inadequate heat treatment, leakage of the seams, etc.). Samples of ham and pork shoulder were pasteurized at 80°C for 1 h, the can contents reaching a core temp. of 71-72°C. Studies on large numbers of cans revealed the presence of *Bacillus cereus*, *B. megaterium*, *B. brevis* and *B. coagulans*. Sources of contamination are discussed. STI

## 46

[Technology and hygienic aspects of the production of canned meat.] Technologie und hygienische Aspekte der Herstellung von Fleischkonserven.

[Lecture]

Prändl, O.

*Wiener Tierärztliche Monatsschrift* 63 (5) 180-187

(1976) [De, en] [Inst. für Fleischhygiene,

Fleischtech. & Lebensmittelkunde, Veterinärmed.

Univ., Vienna, Austria]

The basic principles of heat processing of meat products are discussed, the various technological possibilities considered and the necessary control measures, with particular reference to hygiene, mentioned. So-called canned 'semi-preserves' ( $F_0$  values of 0.65-0.80) should not be produced owing to the possible health hazard and also because the required storage temp. (<15°C) is difficult to ensure in private households. In order to reduce the health hazard,  $F_0$  values of ≥2.5 should generally be adopted for canned meat products. JA

## 47

Canned meat products.

Homburg BV

*British Patent* 1 433 551 (1976) [En]

Deboned meat portions, e.g. hams or shoulders, are injected with brine and moulded ready for canning. IFT

## 48

[Seasoning of meat products intended for canning at high temperature.] Wie würzt man hochoerhitzte Konserven?

Pfeiffer, W.

*Fleischerei* 26 (9) 25-27, VIII (1975) [De, en, fr]

[Wickenreuther Allee 26, 8650 Kulmbach, Federal Republic of Germany]

A brief description is given of studies on organoleptic changes in sausage emulsions (seasoned with various herbs, spices or their extracts) during heat treatment at 121°C. Volatiles were isolated and identified by GLC. Numerous herbs and spices either lost their flavour or developed unpleasant off-flavours during heat treatment at 121°C; recommendations are given for seasoning of meat products intended for heat treatment at high temp. AJDW

## 49

Specification for mutton and goat meat canned in brine.

India, Indian Standards Institution

*Indian Standard IS:1743-1973*, 32pp. (1974) [En]

Price Rs10.50 [Manak Bhavan, 9 Bahadur Shah

Zafar Marg, New Delhi 110001, India]

This standard, first revision of the 1960 standard, prescribes requirements for and methods of sampling and testing the title meats. It covers requirements, packaging, marking, sampling and tests. NaCl content (% by mass) shall be 1.0-2.5 in drained meat and ≥1.5 in brine. Max. requirements are (% by mass); nitrate (as sodium nitrate) in drained meat, 0.05; nitrite (as sodium nitrite) in drained meat, 0.02; total fat, 1.5; free fat, 0.5; and (ppm) As, 1; Pb, 5; Cu, 10; Zn, 50; and Sn, 250. Appendices give procedures for detn. of NaCl, As, Pb, Cu, Zn, Sn, test for microbiological requirements, and sampling of meat canned in brine. AL





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FAB 51

MEAT CANNING

SELECTED FROM VOLUME 9

FOOD SCIENCE AND TECHNOLOGY ABSTRACTS

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H. BROOKES  
ASSISTANT EDITOR





## 1

**Determination of iron and tin in canned meat.**

Uchman, W.; Wojciechowski, J.; Pikul, J.

*Élelmiszervizsgálati Közlemények* 21 (5/6) 284-287 (1975) [7 ref. En, hu, ru, de] [Agric. Univ., Poznan, Poland]

A sample of the canned meat under test is wet ashed with  $\text{HNO}_3 + \text{H}_2\text{SO}_4$ , followed by heating with perchloric acid. Aliquots of the resulting solution are used for detn. of Fe (by the  $\alpha, \alpha$ -dipyridyl method) and Sn (by polarography). Results of practical trials with selected canned meats showed that this method is simple and accurate, and suitable for study of corrosion of cans of meat. IF

## 2

[Improving the quality of meat products by stepwise heating.] Die Stufenkochung als Mittel zur Qualitätsverbesserung von Fleischprodukten. [Lecture]

Reichert, J. E.

*Fleischwirtschaft* 56 (5) 611, 613-614 (1976) [8 ref. De] [Konserven-Inst. Neumünster e.V., Federal Republic of Germany]

Tests with canned liver- and Frankfurter-type sausages in transparent casings (calibre 54), and 'breakfast meat' in  $73 \times 58$  and  $99 \times 119$  mm cans, sterilized at constant  $110-120^\circ\text{C}$  or at progressively rising temp. (e.g. for the 2 types of sausages 20 min at  $80^\circ\text{C}$ , 20 min at  $90^\circ\text{C}$ , 20 min at  $100^\circ\text{C}$ , 18 min at  $105^\circ\text{C}$ , 15 min at  $110^\circ\text{C}$ ) showed that progressive temp. rise produced more attractive products (better colour, flavour and smell) and less fat and jelly separation. The sterilization conditions were compared on the basis of C-values, with  $Z = 33^\circ\text{C}$ . RM

## 3

[Influence of technological additives and of heating on some chemical and physical changes in canned meat. II. Changes in redox potential and some quality characteristics.] Einfluss technologischer Zusätze und des Erhitzungsbereiches auf einige chemische und physikalische Veränderungen von Fleischkonserven. 2. Veränderungen des Redoxpotentials und ausgewählter Qualitätseigenschaften.

Wojciechowski, J.; Pikul, J.; Janitz, W.

*Nahrung* 20 (7) 699-706 (1976) [12 ref. De, en, ru] [Inst. für Tech. der Lebensmittel Tierischer Herkunft, Landwirtschaftliche Akad., Poznan, Poland]

Model canned meat samples were used in a study on effects of heat treatment (pasteurization or sterilization), additives (0.4 or 0.8% ascorbic acid, polyphosphate or gelatin, or mixtures of these additives) and storage time ( $\leq 300$  days) on the redox potential and quality of canned meat. Quality characteristics studied were pH, juice loss, gas formation, meat block size and shape, colour, and off-flavours and odours. Tables of results are given. Heat treatment type considerably influenced redox

potential; after storage for 300 days, sterilized products had a negative and pasteurized samples a positive redox potential. Additives had little effect on redox potential. pH remained stable during storage; heat treatment type had little effect. Samples containing added ascorbic acid were of lower pH than the other samples. Canned meat samples with added ascorbic acid had the highest and those with added gelatin had the lowest juice loss. Effects of heat treatment type and duration of storage were small. [Continued in following abstr.] AJDW

## 4

[Influence of technological additives and of heating on some chemical and physical changes in canned meat. II. Changes in redox potential and some quality characteristics.] Einfluss technologischer Zusätze und des Erhitzungsbereiches auf einige chemische und physikalische Veränderungen von Fleischkonserven. 2. Veränderungen des Redoxpotentials und ausgewählter Qualitätseigenschaften.

Wojciechowski, J.; Pikul, J.; Janitz, W.

*Nahrung* 20 (7) 699-706 (1976) [12 ref. De, en, ru] [Inst. für Tech. der Lebensmittel Tierischer Herkunft, Landwirtschaftliche Akad., Poznan, Poland]

[Continued from preceding abstr.] Gelatin gave the best and ascorbic acid the poorest size and shape retention of the can contents. All the pasteurized samples (except those made with added gelatin) underwent gas formation and off-flavour and odour formation during storage. All sterilized samples remained acceptable. This difference is discussed in relation to redox potential differences. [See FSTA (1976) 8 2S160 for part I.] AJDW

## 5

[Effects of processing methods on residues of antibiotics in meat.] Einfluss von Be- und Verarbeitungstechnologien auf Antibiotika-Rückstände im Fleisch. (In 'Rückstände in Fleisch und Fleischerzeugnissen' [see FSTA (1977) 9 2S164].) [Lecture]

Woltersdorf, W.; Schmidt, U.

pp. 60-72 (1975) [41 ref. De, en] [Inst. für Bakteriologie & Histologie, Bundesanstalt für Fleischforschung, 865 Kulmbach-Blaich, Federal Republic of Germany]

Studies on effects of processing on residues of (i) chlortetracycline, (ii) oxytetracycline and (iii) chloramphenicol in tissues of pigs and calves treated with these antibiotics are described. Processes studied were: storage for 4 wk (non-vacuum packed) or 7 months (vacuum packed) at  $8^\circ\text{C}$ ; frozen storage for 9 months at  $-22^\circ\text{C}$ ; curing for 3 wk; manufacture of smoked and non-smoked raw sausage; manufacture of cooked sausage; and canning of the meat (at temp.  $120^\circ\text{C}$ ). Tables of results are given. Of the processes studied, only heating to temp.  $\geq 100^\circ\text{C}$  gave large decreases in antibiotic concn. (i) was the least and (iii) the most heat-resistant of the antibiotics studied. AJDW



## 6

**[Bacteriology of additives and gelling agents for canned meat: carob seed flour.]**

Cipolla, M.; Cantoni, C.; Aubert, S. d'

*Industria Alimentari* 15 (7/8) 95-98 (1976) [4 ref. It, en] [Istituto di Ispezione degli Alimenti di Origine Animale, Fac. de Med. Vet., Univ. di Milano, Milan, Italy]

The microbiological quality of 30 samples of carob seed flour (products of 5 manufacturers) was evaluated. Ranges of values for various groups of microorganisms were (count/g); total count (at 30-32°C) 500-20 000; yeasts 500-5000; moulds 10-1000; mesophilic actinomycetes 500-5000; mesophilic aerobic sporeformers 500-20 000; thermophilic and thermotolerant organisms 500-20 000; thermophilic actinomycetes 500 (single value given); and thermophilic aerobic sporeformers 0-5000. Organisms identified were *Bacillus subtilis*, *B. licheniformis*, *B. coagulans*, *B. badius*, *B. brevis*, *B. pumilus*, *B. stearothermophilus*, *Saccharomyces* spp., *Aspergillus* spp., *Mucor* spp., *Penicillium* spp., and *Streptomyces* spp. Heat resistance studies showed strains of *B. subtilis* and *B. stearothermophilus* to be resistant to heat treatment at 118°C for 10 min. AJDW

## 7

**Histological, histochemical and ultramicroscopical features of goose fatty liver versus duck fatty liver.** Baldissera Nordio, C.; Ruffini Castrovilli, C. M.; Dell'Orto, V.*Rivista di Zootecnia e Veterinaria* No. 4, 353-359 (1976) [10 ref. En, It] [Istituto di Anatomia e Fisiologia degli Animali Domestici, Univ. di Milano, Milan, Italy]

Histological studies on fatty livers of geese and of ducks are discussed, with the aid of photographs. It is concluded that fatty livers of the 2 spp. may easily be differentiated histologically. The inferior canning quality of fatty duck livers (melting-out of the fat during heat treatment) is discussed with reference to the size and distribution of the fat drops in the liver tissue. AJDW

## 8

**Unconventional proteins as aroma precursors: instrumental and sensory analysis of the volatile compounds in a canned meat product containing soy or rapeseed protein.**Qvist, I. H.; Sydow, E. C. F. von; Akesson, C. A. *Lebensmittel-Wissenschaft und -Technologie* 9 (5) 311-320 (1976) [38 ref. En] [SIK - Swedish Food Inst., Fack, S-400 21 Göteborg 16, Sweden]

A canned meat product containing various amounts of soy or rapeseed protein was analysed by gas chromatography and MS. The headspace of samples heated at 2 temp. (121 and 131°C) and with 6 levels of added protein material (0-40%) was investigated. The sensory properties of the samples were also investigated. To determine correlations between the gas chromatographic data and the

sensory data, stepwise discriminant analysis was applied. The absolute concn. of the volatile compounds in the headspace gas were determined for compounds judged to be of at least potential interest from the aroma point of view. The compounds studied represented aldehydes, ketones, furans, nitriles and S-containing compounds. The sensory properties were studied using an odour quality assessment technique. Increasing amount of added protein material results in decreasing intensities of odour qualities associated with canned meat and increasing intensities of qualities associated with the added protein material. The plausibility of using discriminant analysis of gas chromatographic data for classification of sensory properties is demonstrated by the fact that a high number of correct classifications were obtained for several odour qualities. Also, 2 different test statistics gave similar results for most of the odour qualities analysed. AS

## 9

**[Possible effects of skim-milk powder and hydrolysed milk protein on lowering the level of nitrite added to heat-sterilized meat products.]**

Untersuchungen über die Wirkung von Magermilchpulver und aufgeschlossenem Milcheiweiss im Hinblick auf eine mögliche Senkung des Nitritzusatzes bei hitzesterilisierten Fleischwaren.

Hauser, E.; Hunyady, G.; Schmidhofer, T.; Escher, F.; Denzler, A.

*Fleischwirtschaft* 56 (6) 841-845 (1976) [7 ref. De, en, fr] [Inst. für Lebensmittelwissenschaft, Eidgenössische Tech. Hochschule, Universitätsstrasse 6, 8006 Zürich, Switzerland]

The effect of adding 2% dried skim-milk or hydrolysed milk protein on the quality of canned veal and meat loaf was determined. The additions of milk protein could be important for heat stability if  $\text{NO}_3^-$  or  $\text{NO}_2^-$  levels in sterilized meat products have to be reduced because of potential nitrosamine formation. Tabulated results showed no difference in organoleptic and bacteriological properties between the products with or without added dried skim-milk or hydrolysed milk protein. Dried milk or milk protein could be detected directly in samples treated at 90°C, but in samples sterilized at 115°C only indirectly from other analytical data (% water, total protein, connective tissue protein). Adequate sterilization was achieved only at 115°C (F values 2.5-3), and was not affected by the presence of milk protein. With the recipes used, the use of dried skim-milk or hydrolysed milk protein brought no advantage. RM

## 10

**[Nitrites and nitrates in Polish meat products.]**

Lemieszek-Chodorowska, K.

*Roczniki Państwowego Zakładu Higieny* 27 (4) 387-389 (1976) [4 ref. Pl, ru, en] [Państwowy Zakład Higieny, Warsaw, Poland]

During 1970-1975, a total of 1952 samples of 5



different groups of Polish meat products (finely and coarsely ground sausages; loin, ham, smoked ham; preserves; 'others') was tested for contents of nitrites and 1694 samples were tested for contents of nitrates. Nitrite ( $\text{NaNO}_2$ ) concn. were generally (72.7%) 50 mg/kg, although 2.6% had contents >150-200 mg/kg; nitrate ( $\text{KNO}_3$ ) concn. were more unevenly distributed; 52.2% had concn. 300 mg/kg, but 10.6% had concn. of >1000-2000 mg/kg, and a further 4% concn. of >2000 mg/kg. It is proposed on the basis of the results that the max. permissible concn. of these substances in meat products be reduced to 50 mg/kg for nitrites and 500 mg/kg for nitrates in canned meats, and to 150 and 1000 mg/kg, respectively, in other meat products. HBr

## 11

### Nutritive value of proteins in a canned meat product.

Bender, A. E.; Husaini, -.

*Journal of Food Technology* 11 (5) 499-503 (1976) [10 ref. En] [Dep. of Nutr., Queen Elizabeth Coll., Campden Hill, London W8 7AH, UK]

9 samples of canned meat-with-onions-and-gravy were assayed biologically for net protein utilization (NPU) and 2 samples were analysed for hydroxyproline as a measure of the collagen content. NPU ranged from 40 to 59; the 2 samples each contained 20% collagen. The NPU of meat autoclaved in the laboratory in the presence of wheat flour and glucose was 70 compared with a value of 78 for the same meat autoclaved alone. It is concluded that the low NPU value of canned meat products is due both to the high content of connective tissue and to the loss of available methionine on canning in the presence of other foodstuffs. AS

## 12

### [Food poisoning following consumption of canned meat prepared by a butcher.]

Broek, M. J. M. van den; Bijker, P. G. H.

*Tijdschrift voor Diergeneeskunde* 101 (7) 372-374 (1976) [1 ref. Nl, en] [Vakgroep Voedingsmiddelen van Dierlijke Oorsprong, Fac. der Diergeneeskunde, Rijksuniv., Biltstraat 172, Utrecht, Netherlands]

A case of food poisoning involving a family of 2 adults and 2 children is described; the food poisoning is attributed to consumption of canned meat prepared by a local butcher. Studies on 4 cans prepared by this butcher showed 1 to be leaking, 2 to be swollen, and only one to be in good condition. The can contents contained  $<10^{4.27}$  bacteria/g, mainly Enterobacteriaceae and streptococci. A further 6 cans were studied; 3 (examined immediately after purchase) were of normal quality. The other 3 cans were incubated at 30°C for 7 days; of these 2 remained of acceptable quality and 1 swelled and leaked. Contents of this can contained *Bacillus* sp. at a count of approx.  $10^5$ /g. Investigations showed that the cans had been overfilled, and that the canned meat products had been 'sterilized' in a cooking pot with the steam

vents sealed up and the lid weighted down. The dangers of canning of foods by unskilled personnel and without proper facilities are discussed.

AJDW

## 13

### [Endospore germination and growth of *Clostridium botulinum* B in selected canned meat and meat/vegetable products.]

Mierzejewski, J.; Skoczek, A.

*Przemysł Spożywczy* 30 (8/9) 303-305 (1976) [5 ref. Pl, ru, en, fr, de] [Wojskowy Ośrodek Naukowo-Badawczy Służby Weterynaryjnej, Pulawy, Poland]

6 day-cultures of strain 1162 (State Institute of Hygiene, Warsaw, Poland) of *Cl. botulinum* B were treated with lysozyme and trypsin [Walker & Batty, *Journal of Applied Bacteriology* (1964) 27 (1) 137] and  $10^8$  separated endospores were inoculated into 10 ml samples of aqueous extracts of canned products or introduced into cans, the entry hole being soldered thereafter. The canned products studied were (i) cabbage soup with smoked bacon, (ii) 'bigos' (beef and pork stewed in sauerkraut), (iii) meat balls in tomato sauce, (iv) sausage with cabbage, (v) paprika pork goulash, (vi) beef goulash in Hungarian sauce, (vii) meat and vegetable risotto, (viii) pork goulash in Hungarian sauce, (ix) stuffed cabbage leaves in tomato sauce, (x) minced beef in tomato sauce, (xi) meat with peas, (xii) forcemeat balls in tomato sauce, and (xiii) minced pork in tomato sauce. Germination index, time of appearance of 50% germinated spores, pH of extracts and can contents, and appearance of can blowing at 30°, 20°, or 10°C are tabulated. The germination index increased progressively in the stated order of products, (i) being the most resistant (index, 37.2) and being followed by (ii)-(iv) (index, 41.6-42.4). (v)-(ix) had an index < 50 (46.5-49.7); and (x)-(xiii) were the most susceptible (index, 53.4-60.2). Blowing rates followed broadly the same pattern. SKK

## 14

### A note on the heat resistance of a *Streptococcus faecalis* isolated from a 'soft core' in canned ham. [Lecture]

Gardner, G. A.; Patton, J.

*Proceedings of the European Meeting of Meat Research Workers* No. 21, 52-54 (1975) [19 ref. En, de, fr] [Ulster Curers' Association, 2 Greenwood Avenue, Belfast BT4 3JL, UK]

Isolated from a sample of canned ham suffering from the 'soft core' defect were identified as *Streptococcus faecalis* var. *liquefaciens*. Characteristics of normal and 'soft-core' ham respectively included the following: pH 6.3 and 5.4; NaCl 5.90 and 5.90%;  $\text{NaNO}_3$  < 5 and < 5 ppm;  $\text{NaNO}_2$  24 and 12 ppm; and total colony count  $2.75 \times 10^5$  and  $7 \times 10^8$ /g. Studies on the heat resistance of the *Str. faecalis* var. *liquefaciens* isolate in APT broth and in ham are described. Heat resistance was much higher in ham than in APT broth, and was closely related to the NaCl



content of the medium. The Z value and the  $F_{150}$  value were related; over the range studied, the Z value increased by 1°F for every rise of 31 min in the F value. An extended formula for the heat resistance of *Str. faecalis* var. *liquefaciens* is given. [See FSTA (1977) 9 4S605.] AJDW

## 15

**Dynamics of spore germination and the development of *Clostridium botulinum* type B in canned meat and meat-vegetable preserves.**

[Lecture]

Mierzejewski, J.

*Proceedings of the European Meeting of Meat Research Workers* No. 21, 66 (1975) [5 ref. En] [Res. Cent. of Vet. Service, Pulawy, Poland]

A brief account is given of studies on germination and growth of *Clostridium botulinum* type B in artificially-contaminated canned meat products and meat/vegetable products. Results differed considerably between the products tested; pork or meat balls in tomato sauce supported excellent growth of *Cl. botulinum*, whereas cabbage soup with smoked bacon and sausage in sauerkraut showed inhibitory activity. Low pH was generally related to inhibitory effect, but some relatively high-pH products were inhibitory. A possible stimulatory effect of tomato juice on growth of *Cl. botulinum* is briefly considered. [See FSTA (1977) 9 4S605.] AJDW

## 16

**Estimation of the refrigerated shelf life of pasteurized canned cured ham using an incubation procedure.** [Lecture]

Labots, H.

*Proceedings of the European Meeting of Meat Research Workers* No. 21, 67-69 (1975) [9 ref. En, de, fr] [Cent. Inst. for Nutr. & Food Res. TNO, Zeist, Netherlands]

A brief description is given of studies conducted to evaluate the possibility of development of a rapid laboratory incubation test for estimation of the shelf-life of pasteurized canned ham. Trials were conducted with batches of canned whole hams, ham trimmings and minced ham, incubated at various time/temp. combinations. Data are given for growth of *Bacillus* spp., clostridia, enterococci and other bacteria. It is concluded that variability of response of different groups of bacteria at different temp. is too great to permit acceptably accurate prediction of refrigerated shelf-life. [See FSTA (1977) 9 4S605.] AJDW

## 17

**[Effects of heat treatment under increased pressure on residues of organochlorine pesticides in meat.]**

Einfluss der thermischen Behandlung unter erhöhtem Druck auf den Restgehalt des Fleisches an chlororganischen Pestiziden. [Lecture] Schumkova[Shumkova], I. A.; Karpowa[Karpova], I. N.; Rusankowa[Ruzankova], L. D.; Alexejewa[Alekseeva], L. I.; Ustinova, A. W.[A. V.]

*Proceedings of the European Meeting of Meat Research Workers* No. 21, 187-189 (1975) [11 ref. De, en, ru] [Vses. Nauchno-issled. Inst. Myasnoi Promyshlennosti, USSR]

Studies on destruction of organochlorine pesticide residues in beef and pork autoclaved in glass ampoules at 196 N/m<sup>2</sup> pressure are described. Meat samples containing  $\alpha$ - and  $\gamma$ -BHC at concn. in the range 0.4-1.0 mg/kg were studied. The results show that autoclaving beef for 20 min reduced  $\alpha$ -BHC,  $\gamma$ -BHC and total DDT + metabolites concn. to, respectively, 12.5%, 12% and 41.3% of the initial concn. Corresponding values for pork were, respectively, 47.4%, 31.8% and 54.1%. Autoclaving for 60 min gave only slightly increased pesticide destruction. A further study was conducted on destruction of  $\alpha$ -BHC,  $\gamma$ -BHC and DDT in canned beef, beef tongue and beef liver sterilized at 120°C. Values for residue concn. after sterilization (as % initial value) for  $\alpha$ -BHC,  $\gamma$ -BHC and total DDT + metabolites were, respectively: beef 6.7, 2.3 and 37.8%; tongue 16.7, 5.0 and 38.0%; and liver 1.2, 2.4 and 28.4%. Residual pesticide concn. after sterilization decreased with decreasing particle size of the product. [See FSTA (1977) 9 4S605.] AJDW

## 18

**Epidemiology: Food poisoning from canned pork.**

Anon.

*British Medical Journal* 2 (6049) 1456 (1976) [En]

A brief account is given of an outbreak of violent *Staphylococcus aureus* poisoning (involving 2 people), attributed to canned chopped pork imported from Poland. The meat was found to contain  $6.0 \times 10^7$  *Staph. aureus*/g. Other cans from the same factory also contained *Staph. aureus* strains, which formed enterotoxins A and C. Examination of the cans showed severe seaming defects; no more products from this factory are to be imported until canning standards are improved. AJDW

## 19

**[Evaluation of the uniformity of heat treatment of all parts of a canned meat product. I. The influence of selected technological factors.]** Bewertung der räumlichen Gleichmässigkeit bei der Erhitzung von Fleischkonserven. I. Einfluss von ausgewählten technologischen Faktoren.

Wojciechowski, J.; Pezacki, W.

*Fleischwirtschaft* 56 (9) 1337-1338, 1341-1342, 1345 (1976) [28 ref. De, en, fr] [Inst. für Tech. der Lebensmittel Tierischer Herkunft, Landwirtschaftliche Akad., Wojska Polskiego 31, 60-614 Poznan, Poland]

Effects of raw material composition and degree of comminution on the uniformity of heat-treatment of canned meat were studied; temp. sensors were placed at various distances from the internal walls of the cans. Degree of comminution generally has little effect on the uniformity of heating of canned meat; effects of changes in



contents of water, chopped meat, minced meat or a fat/water mixture also has little effect. A regression equation formulated characterizes the uniformity of heating as a function of the distance of temp. measurement points from the internal surface of the can. This equation is valid for both model products and industrially-manufactured products. AS

## 20

**Effect of ionizing radiation on the sensory characteristics of canned meat products.** [Lecture] Rusz, J.

*Acta Alimentaria Polonica* 2 (3) 175-183 (1976) [En, pl] [Res. Inst. of Meat Ind., Brno, Czechoslovakia]

Pasteurized, sterilized, and pasteurized + irradiated (1 and 2 Mrad) canned ham was evaluated organoleptically immediately after production and after 3 months storage at ambient temp., using a hedonic scoring system. The irradiated product had very poor scores for taste and odour, and score for consistency was slightly lower than for the other hams; the differences were less after storage. Organoleptic evaluation appeared to be much more sensitive for detection of undesirable changes than chemical analysis. Chromatograms of carbonyl compounds isolated from ham processed by heat pasteurization or by pasteurization + irradiation (2 Mrad) are shown. [See FSTA (1977) 9 4A143.] AL

## 21

**Studies on the effect of heat processing on various spoilage values of meat and fish. I. Fat spoilage values of beef.**

Pearson, D.; Bonam, R. J.; Rasanayagam, D. *Journal of the Association of Public Analysts* 14 (3) 105-110 (1976) [15 ref. En] [Nat. Coll. of Food Tech., (Univ. of Reading), Weybridge, Surrey, UK]

Samples of beef dripping were heated in air and processed in cans (in the absence and presence of water) at temp.  $\leq 116^{\circ}\text{C}$ . There were minimal increases in the free fatty acids (FFA), Kreis number, peroxide value and the thiobarbituric acid number. The results obtained on the fat extracted from minced beef cooked in water showed a similar pattern. When minced beef was canned at  $116^{\circ}\text{C}$  each of the 4 values decreased, but they tended to increase on storage. In view of its greater consistency it is suggested that a max. FFA figure (1.5% as oleic acid calculated on the extracted fat) might be of some value for assessing the acceptability (freshness) of canned beef. AS

## 22

**[Effect of heating on the survival of swine fever virus in pasteurized canned ham obtained from experimentally infected animals.]**

Terpstra, C.; Krol, B. *Tijdschrift voor Diergeneeskunde* 101 (22) 1237-

1241 (1976) [10 ref. Nl, en] [Cent. Diergeneeskundig Inst., Afdeling Virologie, Houtribweg 39, Lelystad, Netherlands]

Pigs were experimentally infected with swine fever, and slaughtered during the viraemic stage of infection. The hams were processed by normal commercial methods, packaged in cans (average wt. 5.6 kg) and pasteurized to give max. core temp. over the range  $62.5\text{--}68.5^{\circ}\text{C}$ . Within 24 h of pasteurization, samples of the ham were homogenized and injected into piglets which were later evaluated for swine fever development. The results show that the virus survived in samples heated to a core temp. of  $62.5^{\circ}\text{C}$ , but not in samples heated to core temp. of  $\geq 65^{\circ}\text{C}$  for 30 min. It is therefore concluded that normal commercial pasteurization (to core temp.  $\geq 67^{\circ}\text{C}$ ) should inactivate this virus in hams. This result is discussed in relation to the suggestion that canned hams could introduce swine fever into countries free from this disease. AJDW

## 23

**[Determination of relationship between heating value and the thermal resistance of microorganisms in canned meat.]**

Wojciechowski, J.; Szczepaniak, B.; Morawiak, E.; Piosik, L.

*Nahrung* 20 (10) 883-887 (1976) [12 ref. En, de, ru] [Inst. of Food Tech. of Animal Origin, Acad. of Agric., Poznan, Poland]

A method for evaluation of the relation between F-value and thermal destruction of bacteria in canned meat products was developed. A small Al foil bag containing meat (sterilized by irradiation) is inoculated with the microbial strain under test, sealed and placed at the required position in a can which is then filled with meat, sealed, and sterilized according to the required conditions. The foil bag is then removed, and decimal dilutions are prepared and plated to evaluate survival. Studies were conducted with *Bacillus subtilis* ATCC 6633 and a *B. subtilis* strain isolated from raw meat, using chopped ham as the test material. The trials were conducted in  $90 \times 73$  mm cans, at F-values of 0.24-1.05 min. Graphs of results are given, together with regression equations relating F-value and % surviving bacteria. Correlations between these 2 variables were -0.945 for *B. subtilis* ATCC 6633, and -0.975 for the *B. subtilis* strain isolated from meat. It is concluded that this is a useful method for studies on destruction of bacteria during sterilization of canned meat products. AJDW

## 24

**[Data on nutritive, compositional, qualitative and hygienic values of some foods used in communal feeding of children in the 'Hrana 5' programme. Enrichment of meat and fish products with flour and dried milk.]**

Anon.

*Hrana i Ishrana* 17 (7/8) 353-359 (1976) [Sh] [Zavod za Ekonomiku Domacinstva SR Srbije,



Belgrade, Yugoslavia]

The composition of sausages and canned meat and fish products was studied. Contents of water, protein, fat, carbohydrate, ash, Ca, P and Fe are tabulated. The products were also examined for pesticides ( $\alpha$ -,  $\beta$ -, and  $\gamma$ - and  $\delta$ -BHC, aldrin, dieldrin, endrin, endosulfan, DDT, DDD and DDE). Only  $\gamma$ -BHC was found in meat products (0.06 ppm) whereas in fish paste all the pesticides except  $\beta$ - and  $\delta$ -BHC, aldrin, endrin and endosulfan were detected. IN

## 25

[Rotary sterilization of canned meat products.]

Technik der Rotationssterilisatoren.

Schöpke, G. E.

*Fleischerei* 27 (5) 27-28, IV (1976) [De, en, fr]

[Hermann Stock Maschinenfabrik, Rendsburger Strasse 93, D-2350 Neumünster, Federal Republic of Germany]

## 26

[Vitamin B<sub>1</sub> losses during sterilization.] Vitamin B<sub>1</sub> - Verlust bei der Sterilisation. [Lecture]

Raltschkowska[Ralchovska], E.

*Proceedings of the European Meeting of Meat Research Workers* No. 22, J10:1-J10:6 (1976) [9 ref. De, en, fr, ru] [Meat Rech. Res. Inst., Sofia, Bulgaria]

Studies on thiamin destruction during heat-sterilization of pork in 400-g or 900-g cans (100 min at 120°C) are described. Tables of data are given for thiamin losses at various points in the cans. Thiamin losses in the 400-g cans ranged from 81.3% (centre) to 93.0% (top). Losses in the 900-g cans ranged from 56.3% (centre) to 85.6% (top), mean value (for mixed can contents) 83.3%. Mathematical prediction of thiamin loss gave values lower than those found in practice. [See FSTA (1977) 9 6S988.] AJDW

## 27

[Some biochemical and organoleptic characteristics of canned ham.] [Lecture]

Shirochenko, A. E.; Mikhailova, M. M.; Ludanova, N. V.

*Proceedings of the European Meeting of Meat Research Workers* No. 22, A17:1-A17:5\ (1976) [9 ref. Ru, en, fr, de] [Vses. Nauchno-issled. Inst. Myasnoi Promyshlennosti, Moscow, USSR]

Canned ham prepared by an unspecified rapid method (RM) involving pickling, ripening and heat treatment in sealed containers and completed in 2 days was stored for 1 yr at 12-14°C. Organoleptic quality, and contents of (i) lactic acid, (ii) volatile fatty acids, and (iii) carbonyl compounds were determined initially and after 3, 7 and 12 months in comparison with canned ham made by the customary procedure (CP). It is concluded from graphically presented values that total (i) and (ii)

contents were higher throughout in RM than in CP, irregular variations being present in both; and that, against a background of marked variations, (iii) contents tended to be higher in RM at 7 and 12 months. The tabulated organoleptic scores for taste, aroma, consistency, colour and total quality increased in RM and CP with the progress of storage, scores being higher throughout in RM. [See FSTA (1977) 9 6S988.] SKK

## 28

[The keeping quality of canned ham.]

Untersuchungen über die Haltbarkeit von Dosenschinken. [Lecture]

Baitshev[Baichev], I.; Stefanov, J.[I.];

Dentshev[Denchev], T.

*Proceedings of the European Meeting of Meat Research Workers* No. 22, L7:1-L7:4 (1976)

[De, en, fr, ru] [Inst. für Fleischwirtschaft, Sofia, Bulgaria]

75 samples of ham (in 12-oz cans) were stored at 0-4°C for  $\leq$  12 months; at intervals, the organoleptic properties, microbiological quality and moisture, protein, NaCl, juice, Zn and Pb contents were determined. A table of results is given.

Organoleptic properties (especially appearance, aroma and flavour) deteriorated only slightly during storage for  $\leq$  11 months, but noticeably during the period 11-12 months of storage. Moisture content of the ham increased slightly during storage, as a result of re-absorption of juice. No significant changes in protein, NaCl, Zn or Pb concn. were observed; microbiological quality remained acceptable throughout storage. [See FSTA (1977) 9 6S988.] AJDW

## 29

[Laboratory control of canned meat products for export.]

Takacs, J.; Simonffy, Z.

*Husipar* 25 (3) 98-104 (1976) [2 ref. Hu, en, de, ru] [Allatorvostudományi Egyetem Elelmiszerhigiéniai Tanszek, Landler Jenő ut 2, 1078 Budapest, Hungary]

## 30

[Manufacture of sliced bacon at the Kapuvar meat processing plant.]

Janko, F.

*Husipar* 25 (6) 275-278 (1976) [Hu, en, de, ru] [Győr-Sopron Megyei Állatforgalmi és Husipari Vállalat, Vagóhid u. 7, 9027 Győr, Hungary]

A detailed description is given of the new production line for manufacture of canned sliced bacon (packaged in 1-lb cans for export). Throughput is approx. 1500 t/yr. Aspects described include cutting of the carcass, curing, smoking, slicing, portioning, canning, autoclaving, and packaging of the canned product. AJDW



## 31

**[The effect of vacuum on ham brining.]**

Dzoljic, D.; Stamenkovic, T.; Loncar, A.  
*Tehnologija Mesa* 17 (2) 38-41 (1976) [45 ref.  
 Sh] [Jugoslavenski Inst. za Tehnologiju Mesa,  
 Belgrade, Yugoslavia]

Hams of meat-type pigs were (i) injected with brine using a pickle injector, (ii) left hams injected as (i) and tenderized immediately for 51 min by mechanical kneading and again for 51 min 19 h after injection, and (iii) right hams were tenderized as (ii) immediately after injection and then 3 × for 17 min each time every 6 h 31 min after beginning of injection. Mechanical treatment of (ii) and (iii) was carried out under reduced pressure. Biceps femoris and quadriceps femoris muscles of (i)-(iii) were examined for % myoglobin conversion to nitrosomyoglobin and nitrite content 14 and 20 h after brine injection. (i)-(iii) hams pasteurized in cans were assessed organoleptically. It is concluded from tabulated and graphically presented results that (ii) and (iii) procedures promoted nitrosomyoglobin formation and nitrite breakdown in comparison with (i) and resulted in better organoleptic quality of preserved hams; and that (iii) was superior to (ii) in these respects. SKK

## 32

**[Detection and type determination of *Clostridium perfringens* isolated from preserved meat.]**

Popova, V.

*Veterinarnomeditsinski Nauki* 13 (10) 91-95  
 (1976) [18 ref. Bg, ru, en] [Tsentrallen VetMed.  
 Inst., Sofia, Bulgaria]

92 samples of pasteurized canned meat were examined; 6 strains of *Cl. perfringens* were isolated from 1 can of pasteurized ham. Closer study of 1 strain by preparation of dry toxin and cross toxin neutralization showed that it belonged to type A. Use of native toxins isolated from foods proved unsatisfactory for typing of weakly toxinogenic strains. SKK

## 33

**Effect of heating time on volatile composition of canned pork meat.**

Uchman, W.; Jennings, W. G.

*Food Chemistry* 2 (2) 135-144 (1977) [12 ref.  
 En] [Dep. of Food Sci. & Tech., Univ. of California,  
 Davis, California 95616, USA]

Volatiles from samples of ground pork meat, subject to 10, 20, 30 and 40 min heating at 121°C, were isolated by trapping on Tenax GC and Porapak Q. Essences were compared on wall-coated open-tubular glass capillary columns and analysed by glass capillary GLC-MS. Low mol. wt. alcohols, many with branched-chain skeletons, mercaptans and cyclic products were among the compounds identified. The amount of volatiles present appeared to correlate well with the heating time to which the sample had been subjected. AS

## 34

**Gamma irradiation at  $-30 \pm 10^\circ\text{C}$  of low level nitrite/nitrate ham.**

Anellis, A.; Shattuck, E.; Latt, T.; Songpasertchai, S.; Rowley, D. B.; Ross, E. W., Jr.

*Abstracts of the Annual Meeting of the American Society for Microbiology* 76, 189 (1976) [En]  
 [Natick Development Cent., Natick, Massachusetts 01760, USA]

An inoculated, irradiated ham pack study was conducted to establish the dose required to reduce the number of *Cl. botulinum* spores by a factor of  $10^{-12}$ . The ham contained 25 mg/kg of nitrite and 100 mg/kg of nitrate. Each can contained a mixture of  $10^3$  spores of each of 10 strains (5 type A and 5 type B). The cans were irradiated to various doses with  $^{60}\text{Co}$  gamma rays at  $-30 \pm 10^\circ\text{C}$ , incubated for 6 months at  $30 \pm 2^\circ\text{C}$ , and examined for swelling and botulinal toxins and cells. The traditional 12D dose (an exponential death rate minus an initial shoulder) was 3.3 Mrad when computer on the basis of  $10^7$  spores/can, and 3.8 Mrad when assumed that each can of beef contained  $10^6$  spores of a single most resistant strain. Extreme Value statistical analysis indicated that the spore death rate was neither a simple exponential nor a normal death rate but could be a shifted exponential (with an initial shoulder), Weibull or lognormal with a 12D equivalent of 3.0 Mrad if the spore level is  $10^7$ /can and 3.2 Mrad assuming  $10^6$  spores/can. A large number of cans had a mixture of types A and B toxins; many of these cans did not have the expected mixture of types A and B recoverable cells, but had only A or B cells. At 1.4 and 1.7 Mrad, type B cells predominated, but at 2.0 Mrad type A cells predominated. AS

## 35

**[Proposals for classification of meat products in the EEC.]**

Cantoni, C.; Cattaneo, P.; Perlasca, M.

*Industria Alimentari* 16 (1) 77-84 (1977) [10 ref.  
 It, en] [Istituto di Ispezione degli Alimenti di  
 Origine Animale, Univ. degli Studi di Milano,  
 Milan, Italy]

German proposals for classification of meat products are discussed, including: classification into fresh meat and meat-based products; classification of meat products (on the basis of their pH and  $a_w$  values) into highly-perishable and relatively non-perishable categories (with specified storage temp. requirements); and classification of canned foods into semi-preserved, 1-preserved, and fully-preserved products, or preserved products for tropical countries (on the basis of their F-values during sterilization). Tables of literature data for the pH and  $a_w$  values of various meat products are given. Tables of experimental data are given for the pH,  $a_w$  value, salt/moisture ratio, bacterial counts and moisture, lipid, protein, ash, NaCl,  $\text{NO}_2^-$ ,  $\text{NO}_3^-$  and lactic acid contents of 209 Mortadella sausages of various wt., the pH,  $a_w$  value, total moisture content, free water content, salt/moisture ratio, acidity, and salt, volatile acid and lactic acid



contents of 44 samples of ripened raw ham, and the  $a_w$  values of 76 samples of Milan-type salami. The results are discussed in relation to classification of the perishability of these products according to the German proposals. AJDW

### 36

[Quality control of batches of canned goulash by means of closed sequential schemes.] Zur Qualitätskontrolle von Dosengulasch-Chargen mittels geschlossener Sequentialpläne. Hildebrandt, G.; Kretschmer, F.-J.

*Fleischwirtschaft* 56 (11) 1633-1636, 1639-1640 (1976) [many ref. De, en, fr] [Inst. für Lebensmittelhygiene, Fleischhygiene & -Tech., Freie Univ. Berlin, Bitterstrasse 8-12, 1000 Berlin (West) 33]

Quality control of canned goulash by the preparative method via the % lean meat is discussed with reference to in-factory and official control requirements. Analysis of 172 samples taken from 3 days' production over 2 months at a large plant showed such good agreement between the % lean meat on fresh or dry wt. basis ( $r = 0.955$ ) that the detn. of lean meat DM (proposed in the German Guideline of 1969 for canned products with  $\leq 45\%$  lean meat, fresh wt. basis) seems unnecessary except for occasional checks or special circumstances. Daily production is a suitable reference figure for statistical quality control because it is a comprehensive and definable unit of manufacture; random samples from small homogeneous lots are not adequate for production control. For practical purposes, 2 test variants of closed sequential 3-decision schemes with varying selectivity are suggested [see FSTA (1976) 8 1S37 and 5S794]. Depending on the selected theoretical or guide value, they allow a product to be judged as too good-correct-poor (in-factory control) or good-poor-very poor (official control). RM

### 37

**Bacteriological survey and refrigerated storage test of vacuum-packed sliced imported canned ham.**

Surkiewicz, B. F.; Harris, M. E.; Carosella, J. M. *Journal of Food Protection* 40 (2) 109-111 (1977) [7 ref. En] [Anim. & Plant Health Inspection Service, USDA, Beltsville, Maryland 20705, USA]

At the time of slicing and packaging, 179 of 180 retail-sized vacuum-packed sliced ham samples collected from 12 establishments had aerobic plate counts of  $< 2000/g$ . Coliforms were isolated from only 3 of the samples, and all samples were negative for *Escherichia coli*, *Staphylococcus aureus*, and *salmonellae*. When stored at  $3^\circ C$ , bacterial growth in vacuum-packed sliced ham proceeded at a rate similar to that of non-vacuum-packed cross-sections cut from hams just before slicing. However, after 68 days of refrigerated storage, there was no bacterial growth in a non-vacuum-packed cross-section cut from a ham removed from a can with strict aseptic techniques. These results suggest that the slight contamination

upon opening canned hams by conventional methods may have as great an effect on the bacteriological stability of sliced ham as any additional slight contamination from the slicing-packaging operation. AS

### 38

**[Effects of liver and pork on heat penetration during thermal processing, and the quality of meat pastes.]**

Stamenkovic, T. B.

*Tehnologija Mesa* 17 (6) 162-164 (1976) [6 ref. Sh, en] [Jugoslovenski Inst. za Tehnologiju Mesa, Belgrade, Yugoslavia]

The effects of liver and blanched pork contents on the heat penetration characteristics and colour of 4 types of meat paste were studied. Liver was found to retard heat penetration through the canned product during heat treatment; however, liver improves the colour, taste, flavour and consistency of the product. The liver/meat ratio is an important factor determining the quality of the product. STI

### 39

**[Manufacture of prepared meals in meat processing plants.] Herstellung von Fertiggerichten im Fleischereibetrieb.**

Pfeiffer, W.

*Fleischerei* 27 (12) 14-16, III (1976) [De, en, fr] [Wickenreuther Allee 26, D-8650 Kulmbach, Federal Republic of Germany]

Manufacture of canned meat-based prepared meals is discussed. Aspects considered include: ingredients required (including special thickener/stabilizer preparations, and light and dark stocks); equipment required; sterilization conditions for fully-preserved and 1-preserved products; and labelling requirements. Recipes are given for various products, including: roast beef; sauerbraten; ox tongue in madeira; roast pork; veal or poultry ragouts; goulash; kidneys in sour sauce; and minced meat products. AJDW

### 40

**[Equipment and materials for meat canning industry and auxiliary processes.] Oborudovanie i materialy dlya myaso-konservnogo i vspomagatel'nykh proizvodstv. [Book]**

Gorbatov, V. M.

437pp. (1976) [numerous ref. Ru] Moscow, USSR; Pishchevaya Promyshlennost'. Price 1.75r

The book represents a collection of individual papers including: Equipment and materials for the manufacture of metal containers, by Ya. Yu. Lushkin (pp. 3-64); Technological equipment for meat canning plants, by Z. P. Gusakovskii (pp. 64-106); Materials, packaging and packaging equipment for meat and meat products, by N. F. Generalov, P. S. Gnoevoi & O. V. Bol'shakov (pp. 106-154); Metallic materials for the production and repair of meat cannery equipment, by N. F. Kazakov & A. P. Shishkova (pp. 154-194); Non-



metallic materials for the manufacture and repair of meat cannery equipment, by S. V. Genel' (pp. 194-228); Conveyors, cutters and balances, by A. N. Saltykov & E. N. Lanovskaya (pp. 228-360); Equipment for the supply of electricity, by N. S. Muromova, Yu. A. Sapunov & I. K. Kozyrkin (pp. 360-392); and Equipment for the supply of heat, by A. N. Lepilkin, S. I. Nozdrin & A. M. Tertychnyi (pp. 392-427). STI

## 41

[Thermal processing and its effect on the release of meat juice during manufacture of canned pork.] Mihajlovic, B.; Vuksan, B.; Kampus, A.

*Tehnologija Mesa* 17 (7/8) 213-215 (1976) [5 ref. Sh, en] [Jugoslovenski Inst. za Tehnologiju Mesa, Belgrade, Yugoslavia]

Studies were conducted on: effects of heating time and core temp. of the can contents on the release of juice by the meat; effects of thermal processing on proteins in the meat and the juice; and the effects of HTST processing on the organoleptic properties of canned pork. The product studied was pork chunks (3 cm × 2 cm) with added salt, paprika and onions; the cans were 90 mm diam., 123 mm tall, with a capacity of 900 g. Sterilization was for 45 + 100 + 30 min at 120°C, or 30 + 50 + 30 min at 130°C. The results show that sterilization at 130°C gives greater juice release, less fat release and improved keeping quality of the product. The organoleptic properties of pork sterilized at 120° or 130°C did not differ significantly. STI

## 42

[Effect of quantity of sodium nitrite added during curing on colour stability of canned pasteurized meat.]

Klossowska, B.

*Roczniki Instytutu Przemysłu Miesnego i Tłuszczowego* 13 79-91 (1976) [17 ref. Pl, ru, en] [Inst. Przemysłu Miesnego i Tłuszczowego, Warsaw, Poland]

In model experiments, lean muscles taken from hams held at 4-6°C for 24 h after slaughter and freed from fat and tendons were minced and blended with a curing mixture consisting of (kg/100 kg meat): 3.9 NaCl, 2.0 glucose, 0.05 sodium ascorbate and 0.5 polyphosphate, together with NaNO<sub>2</sub> to give (depending on treatment variant) a concn. of 0, 5, 10, 20, 40, 80, or 160 ppm in the mix. The mixes were sealed in 102.5 × 77 mm cans and heated to achieve a temp. rise in the centre at the rate of 1°C/4 min in the 40-48°C range and at the rate of 1°C/8 min in the 49-68°C range; the cans were cooled in running cold water for 2 h and stored for <9 months at 4-6°C. Colour of samples was evaluated by reflectance measurement at 540 and 640 nm using a Pye-Unicam spectrophotometer and calculation of dominant wavelength (DW), colour brightness and saturation with the chromatic component. It is concluded from tabulated and graphically-presented results that

DW stability decreased drastically with increase in duration of storage; that addition of NaNO<sub>2</sub> increased DW stability only to a limiting value determined by duration of storage; that with NaNO<sub>2</sub> at approx. 50 ppm, DW stability reached 95% of the limiting value at a given duration of storage; and that duration of storage should be <3 months to ensure DW stability of 45% of the initial value. SKK

## 43

Cryogenic radappertization of pork.

Anellis, A.; Shattuck, E.; Morin, M.; Srisara, B.; Rowley, D. B.

*Abstracts of the Annual Meeting of the American Society for Microbiology* 77, 258 (1977) [En] [US Army Lab., Natick, Massachusetts, USA]

A pork pack (2100 cans), inoculated with an equal mixture of 5 type A and 5 type B strains of *Clostridium botulinum* spores (10<sup>6</sup> spores/strain; 10<sup>7</sup> spores/can), was irradiated to various doses (100 cans/dose) with <sup>60</sup>Co γ-rays, incubated for 6 months at 30 ± 2°C, and assayed for swelling, toxicity, and viable botulinal cells. Based on the presence of viable cells, a single most resistant strain out of the 10 inoculated, and a shifted exponential (with an initial shoulder) spore death rate, calculation by extreme value statistics gave a 12D dose of 4.37 Mrad. Cans with type B cells and type B toxin predominated significantly over cans with type A cells or toxin, but there were a larger number of cans with a mixture of types A and B toxin than with a mixture of types A and B cells. Contrary to the findings in beef, type B strains had an apparent higher survival ratio than type A strains in the pork competitive microenvironment at lower doses; yet at the highest sublethal doses (2.8 and 3.0 Mrad) only type A strain(s) survived. AS

## 44

Nitrite and sulfhydryl groups in the inhibition of *Clostridium botulinum* in meat products.

Lee, S. H.; Cassens, R. G.; Sugiyama, H.

*Abstracts of the Annual Meeting of the American Society for Microbiology* 77, 246 (1977) [En] [Univ. of Wisconsin, Madison, Wisconsin, USA]

Ground pork trim (approx. 20% fat) was formulated with 2.5% salt, and 0, 50, 100, 150, 200 or 300 ppm of NaNO<sub>2</sub>, canned and heated at 90°C for 1.5 h, 100°C for 2.0 h or 110°C for 2.5 h. Some of the meat was treated with silver lactate to block endogenous sulphhydryl groups before it was mixed with the curing agent. Tests with Ag treated meat showed spores would germinate in it. Meat homogenates were made from all treatment combinations by diluting the meat 1:1 with buffer (pH 6.1), and the level of free nitrite was adjusted to 30 ppm to eliminate the effect of different levels of residual nitrite. Tubes were inoculated with spores of *C. botulinum* 62A and observed for gas production at 30°C. Cans heated at 100°C were stored 8 wk, then also inoculated and observed for swelling at 22°C. An inhibitor due to heating nitrite



in the presence of meat was detected in both the canned product and homogenates. Its activity was lower when product was processed at higher temp. and decreased during prolonged storage. Similar results were obtained from Ag treated meat indicating that SH groups are not necessary for formation of the inhibitor. AS

## 45

[Correct emulsification in the manufacture of canned liver sausage.] Richtiges Emulgieren bei der Produktion von Leberwurst-Konserven.

Kasper, W.; Kissinger, R.

*Fleischerei* 28 (1) 25-26 (1977) [De] [Van Hees GmbH, Veilchenweg 2, D-6229 Walluf bei Wiesbaden, Federal Republic of Germany]

The utilization of mono- and diglycerides (and their esters with citric or lactic acids) as emulsifiers in canned liver sausage is briefly discussed, with reference to: the non-toxic nature of these compounds; lack of requirements for label declaration; basic principles of emulsifier activity; factors influencing the emulsifier concn. required (recipe, planned heat treatment of the product, conditions during comminution of the sausage emulsion); and practical aspects of use of these emulsifiers in liver sausage manufacture. AJDW

## 46

[Manufacture of canned liver sausage. I.] Zur Herstellung von Leberwurstkonserven. I. Reichert, J. E.

*Fleischerei* 28 (1) 33-36 (1977) [17 ref. De] [Tungendorfer Strasse 93a, D-2350 Neumünster, Federal Republic of Germany]

Procedures for detn. of the optimum processing conditions for heat-sterilization of canned liver sausage are discussed in detail, with the aid of examples. The effects of heating time and temp. on product quality are presented graphically; the potential quality attainable under specified heating conditions may be evaluated. Tables are given for calculation of deterioration during heat-treatment (C-values) by the addition method. Effects of the specific surface of the container on the optimum sterilization temp. (in dependence on the F-value) are also discussed. AJDW

## 47

Specification for ham, canned.

India, Indian Standards Institution

*Indian Standard* IS:4951-1975, 8pp. (1976) [En] Price Rs5.00 [Manak Bhavan, 9 Bahadur Shah Zafar Marg, New Delhi 110002, India]

This revision of the 1968 standard incorporates some modifications, viz. details of treatment of ham are specified, vacuum requirement has been modified, requirement for storage is included, and newer test methods are specified. Requirements for canned ham and shoulder include: NaCl content, 1.5-3.5%; nitrite content (as  $\text{NaNO}_2$ ),  $\leq 0.02\%$ ;

nitrate content (as  $\text{NaNO}_3$ ),  $\leq 0.05\%$ ; and vacuum at  $27 \pm 2^\circ\text{C}$  at normal atm. pressure,  $\geq 3.33 \text{ kN/m}^2$ . Max. limits for metallic impurities are (mg/kg): As 1, Pb 5, Cu 15, Zn 19 and Sn 140. AL

## 48

[Quality evaluation of beef in its own juice.] Zur Qualitätsbeurteilung von Fleisch i.e. Saft.

Linke, H.; Gross, B.; Eigner, U.

*Archiv für Lebensmittelhygiene* 27 (6) 215-218 (1976) [17 ref. De, en] [Bundesanstalt für Fleischforschung, 8650 Kulmbach, Federal Republic of Germany]

Investigations on canned beef in its own juice showed that the connective-tissue protein-free meat protein (BEFFE) content decreased with increasing intensity of heat treatment (i.e. from 90 min at  $100^\circ\text{C}$  to 70 min at  $112^\circ\text{C}$  and 75 min at  $120^\circ\text{C}$ ) when determined by decoction with phosphate buffer (DP) or by hydroxyproline detn. (HP). Nevertheless, the heat depression of BEFFE is of no significance during commercial heat preservation of meat in its own juice or as corned beef. Neither of the 2 methods of detn. was preferable; their results were closely, though not linearly, correlated ( $r = 0.883$ ). Based on analyses and calculations by Bertling [FSTA (1970) 2 10S970, (1973) 5 2S180, (1973) 5 6S633] the standards for BEFFE determined by DP and HP for beef in its own juice were characterized by a guide value of 12 and 15% for DP and HP respectively, and for pork in its own juice by 10.5 and 13.5% respectively. In view of the varying conditions under which 'Schmalzfleisch' is produced, separate guide values should be applied for this product. The need for drawing up absolute tolerance limits for quality, with testing principles based on actual standards, is emphasized. RM

## 49

[Detection of soya protein in canned meat heat-treated at  $120^\circ\text{C}$ .] Nachweis von Sojaeiweiss aus auf  $120^\circ\text{C}$  erhitzten Fleischkonserven.

Baudner, S.; Schweiger, A.; Günther, H. O.

*Mitteilungen aus dem Gebiete der Lebensmitteluntersuchung und Hygiene* 68 (2) 183-185 (1977) [3 ref. De, fr, en] [Behring-Werke, D-3550 Marburg, Federal Republic of Germany. Reprint address: H. O. Günther, Landesuntersuchungsamt für das Gesundheitswesen Südbayern, Fritz-Hintermayr-Strasse 3, D-8900 Augsburg, Federal Republic of Germany]

The method described by Günther [FSTA (1969) 1 10S746] for detection of soy protein in heat-treated meat products using 3 combined soy antisera fails at treatment temp.  $> 117^\circ\text{C}$  because of loss of antigenic properties. For detection of soy protein in canned meat sterilized at  $120^\circ\text{C}$  for 50 min, separation of soy protein components or fragments by polyacrylamide electrophoresis, purification by free-flow electrophoresis according to Hennig, and conjugation with human or bovine albumin are recommended, the conjugate being



endowed with antigenic properties. Another possibility is to use the more accurate though painstaking procedure of Stein et al. [Analytical Biochemistry (1974) 60, 272]. SKK

## 50

[Optimization of the quality of canned meat products illustrated by liver sausage prepared with stepwise cooking and choice of containers with good thermal properties.] Optimierung der Qualität von Wurstkonserven am Beispiel von Leberwurst durch Anwendung der Stufenkochung und wärmetechnisch günstiger Behälterauswahl. Reichert, J. E.

*Fleischwirtschaft* 57 (5) 900, 902, 904, 906, 908 (1977) [9 ref. De] [Konserven-Inst. Neumünster eV, Wasbeker Strasse 324, 2350 Neumünster, Federal Republic of Germany]

Sterilization tests with liver sausage in deep-drawn Al-laminate bowls (70 × 35 mm), cans (73 × 58 mm and 99 × 33 mm), plastics bowls (80 × 80 mm) and glass jars (200 g, 82 × 60 mm) showed the effects of the type and format of the container on the surface quality of the product. Calculations for predicting the quality under known heating conditions based on the specific C-values for liver sausages are described [see FSTA (1977) 9 7E254]. Optimum heating conditions and quality obtained for the usual types and sizes of containers are shown in tabular form. The quality of the product was improved by 1 point (on a 9 point scale) if canned liver sausage (73 × 58 mm can) was heated to 109°C in 4 steps, i.e. to 80°, 87°, 98° and 109°C, instead of a single step heating to 110°C. RM

## 51

[Factors important for calculation of the F value in pasteurized canned meat.]

Vukovic, I.

*Tehnologija Mesa* 17 (9) 256-259 (1976) [17 ref. Sh, en] [Vet. Fak., Belgrade, Yugoslavia]

The F value, expressing the number of min required to destroy all microorganisms at 65.5°C, was calculated using methods developed for canned fruit and vegetable products; these methods were shown to be inadequate for canned meat products. To establish the optimal pasteurization conditions for meat, the following data are needed: parameters of the heat resistance of those microorganisms which can survive pasteurization; the degree of 'safety' required from the pasteurization; effect of heat on the microorganisms in the canned food; temp. at the least-heated point in the canned product; and properties of the can. Equations for computing the F value are derived, and a detailed explanation is given of the relationship between the F required to destroy the microorganisms at all points in the canned product and the F in the least heated zones of the product. STI

## 52

[A modern technique for manufacture of canned 'hen in jelly' and 'poultry ragout in jelly'.]

Gonotskii, V. A.; Pugacheva, A. F.

*Trudy, Vsesoyuznyi Nauchno-Issledovatel'skii Institut Myasnoi Promyshlennosti* 19, 41-43 (1975) [Ru]

Manufacture of canned 'hen in jelly' and 'poultry ragout in jelly' is discussed. Use of non-blanching chilled or frozen poultry is recommended. Optimum meat, ragout and bouillon ratios and raw material quality requirements are suggested. Sterilization of the canned product at 120°C is recommended. Manufacture of these products under industrial conditions was tested. Microbiological quality was found to comply with Soviet standard requirements, and organoleptic properties were superior to those of products manufactured by existing practices. STI

## 53

Inhibitory effect of some Perigo-type compounds on clostridium spores in pasteurized meat products. (In 'Proceedings of the Second International Symposium on Nitrite in Meat Products' [see FSTA (1977) 9 12S2047].) [Lecture]

Roon, P. S. van; Olsman, W. J.

pp. 53-61 (1977) [En] [Fac. of Vet. Med., Univ. of Utrecht, Biltstraat 172, Utrecht, Netherlands]

Studies were conducted on inhibition of clostridia by NaNO<sub>2</sub> and cysteyle nitric oxide ferrate (CNOF) in pasteurized meat products. Incubation trials showed that CNOF was a poorer inhibitor of clostridial growth than nitrite. Storage at 8°C for ≤6 months considerably reduced the content of total nitrite in samples containing NaNO<sub>2</sub>. In samples containing CNOF, almost all the nitrite was present in the protein-bound form; total nitrite concn. varied little during storage. In a second study, cans of inoculated beef (with added NaNO<sub>2</sub> or NaNO<sub>2</sub> + Fe<sup>2+</sup>) were held for 0-4 wk at 3°C immediately after pasteurization; they were then incubated at 30°C, and subsequently tested for swelling and clostridial growth. Delay before swelling increased with increasing time of holding at 3°C before incubation; this effect was greater for samples at pH 5.9 than for those at pH 6.2. The increased inhibitory activity seemed to be related to increased protein-bound nitrite concn.; however, addition of Fe<sup>2+</sup> increased protein-bound nitrite concn. but reduced inhibitory activity. Further studies were conducted on inhibition of clostridia by NaNO<sub>2</sub> or S-nitrocysteine in canned chopped ham; inhibitory activities of the 2 additives were similar. S-nitrocysteine was found to be labile in the brine added to the ham during chopping. AJDW

## 54

Inhibition of clostridia by iron nitrosylsulfides and citric acid in canned ham. (In 'Proceedings of the Second International Symposium on Nitrite in Meat Products' [see FSTA (1977) 9 12S2047].) [Lecture]

Huhtanen, C. N.; Dymicky, M.; Wasserman, A. E. pp. 47-52 (1977) [En] [USDA, Philadelphia, Pennsylvania 19118, USA]

Studies were conducted on the inhibitory activity of iron nitrosylsulphides (INS) against clostridia, especially *Cl. botulinum*. In a tryptone/yeast medium, the min. inhibitory concn. of INS was 0.16 mg/l., vs. 80 mg/l. for  $\text{NaNO}_2$ ; however, addition of meat or meat extract to the medium prevented inhibitory activity of INS. Practical trials with canned ground ham inoculated with *Cl. sporogenes* also showed INS to be ineffective for control of clostridia. Effects of the pH and meat/INS ratio on absorption of INS by ham were studied. Absorption tended to increase with decreasing pH. Approx. 40 g fresh ham or 10 g cooked ham were required to adsorb 125 µg INS from solution. It is concluded that INS are not of use for control of clostridia in canned meat. Studies were also conducted on the possible use of HCl (6 mol/l.) or citric acid (1.5 g/l.), added alone or in the presence of 25 mg  $\text{NaNO}_2$ /kg, for control of *Cl. botulinum* or *Cl. sporogenes* in canned ham. The results suggest that added acids, either alone or in combination with  $\text{NaNO}_2$ , may delay spoilage by clostridia; inhibitory activity of citric acid without  $\text{NaNO}_2$  seemed to be greater than that of HCl without  $\text{NaNO}_2$ . AJDW

## 55

**Carcinogenicity study on rats fed on canned heated nitrite-treated meat: preliminary communication.**

(In 'Proceedings of the Second International Symposium on Nitrite in Meat Products' [see FSTA (1977) 9 12S2047].) [Lecture]

Olsen, P.; Meyer, O.

pp. 275-278 (1977) [En] [Inst. of Toxicology, Nat. Food Inst., DK 2860 Soborg, Denmark]

A total of 626 rats was used in a 132 wk, 2-generation feeding trial conducted to evaluate the carcinogenicity of canned chopped pork containing 0-4000 mg nitrite/kg. A control group of rats received a diet based on casein. Data for the incidence of benign and malignant tumours show no significant effect of the nitrite content of the diet on the incidence of either benign or malignant tumours. Dimethylnitrosamine was present in the canned meat containing 4000 mg nitrite/kg, but not in samples containing lower levels of nitrite.

AJDW



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FAB 51

MEAT CANNING

SELECTED FROM VOLUME 10

FOOD SCIENCE AND TECHNOLOGY ABSTRACTS

under the direction of

Commonwealth Agricultural Bureaux, Farnham Royal, Bucks; Gesellschaft für Information und Dokumentation, Frankfurt am Main; Institute of Food Technologists, Chicago; Centrum voor Landbouwpublikaties en Landbouwdocumentatie (Pudoc), Wageningen.



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H. BROOKES

ASSISTANT EDITOR





## 1

[The behaviour of some microorganisms in canned foods.]

Vicini, E.; Gola, S.; Liverani, G.

*Industria Conserve* 52 (2) 115-124 (1977) [19 ref. It, en, de, fr] [Sta. Sperimentale per l'Ind. delle Conserve Alimentari, Parma, Italy]

11 strains of microorganisms (6 of *Staphylococcus aureus* and 1 each of *Streptococcus faecalis*, *Enterobacter aerogenes*, *Pseudomonas* sp., *Bacillus subtilis* and *B. licheniformis*) were inoculated into canned foods including peas, beans, beef in gelatin, luncheon meat and tuna in oil at  $10^2$  cells/can, i.e. concn. which might result from minute punctures in the cans and contaminated cooling water, and stored at  $25^\circ\text{C}$  for  $\leq 210$  days. Changes in bacterial counts, pH, blown cans, the number of cell doublings and decimal reduction times, as well as head space gases, were determined. Tabulated results showed that spoilage generally occurred within 10 days and was mainly swelling of the cans as a result of bacterial gas production. All the microorganisms examined were able to produce  $\text{H}_2$  and/or  $\text{CO}_2$  under suitable conditions. Cell survival in spoiled foods varied with the organism and the product; in meat products, inactivation was much slower than in vegetables where  $> 8$  decimal reductions can be obtained in 2 months. The canned foods could be spoiled without obvious macroscopic changes to containers or foods, showing that bacteriological analysis is essential for detn. of sterility and stability of canned foods. RM

## 2

[Determination of cadmium in foods.]

Parolari, G.; Pezzani, G.

*Industria Conserve* 52 (2) 130-132 (1977) [19 ref. It, en, de, fr] [Sta. Sperimentale per l'Ind. delle Conserve Alimentari, Parma, Italy]

The proposed method involves destruction of the sample either by acid digestion or by ashing at  $350^\circ\text{C}$ . extraction of Cd as dithizonate and detn. of the metal by flameless AAS at 229 nm. The specificity of the extraction and the sensitivity of the AAS method allow detn. of traces of Cd with good reproducibility in samples rich in interfering ions, e.g. preserved foods. Tabulated results of analyses show Cd contents (parts/billion (p.p.b.)) of 13 and 14 in fresh pork, 28 and 29 in cooked ham, 24 in Mortadella, 18 in canned meat (with 95-108% recovery from 40 p.p.b., 90-120% from 10 p.p.b. added Cd), 72 in canned tuna and 475 in fresh kidney (suggesting in vivo renal accumulation). The concn. in triple tomato concentrate (6 replicates) varied from 9.6 to 11.9 p.p.b., with 8.49% error. RM

## 3

[Presence of nitrate and nitrite in horse meat, and oxidation of nitrite to nitrate in canned meats.]

Cantoni, C.; Bianchi, M. A.

*Archivio Veterinario Italiano* 28 (1/2) 47-48 (1977) [9 ref. It, en] [Istituto di Ispezione degli

Alimenti di Origine Anim., Univ. degli Studi di Milano, Milan, Italy]

Nitrate and nitrite were determined in 5 samples each of frozen horse meat from (i) Brazil, (ii) Argentina and (iii) Uruguay; 5 samples of (iv) fresh Italian horse meat were also tested. Nitrite concn. determined were (mg/100 kg): (i) 89-153; (ii) 153-160; (iii) 14.6-22; and (iv) 20-29. Trials were conducted to evaluate oxidation of added nitrite to nitrate in canned meat. Samples of canned meat (with 100 mg added nitrite/100 g) were sterilized at  $120^\circ\text{C}$  for 4 h; nitrite and nitrate concn. in the canned product were, resp., 20-26 and 30-37 mg/100 g. AJDW

## 4

Variation in inhibition of *C. botulinum* by nitrite in perishable canned comminuted cured meat.

Tompkin, R. B.; Christiansen, L. N.; Shaparis, A. B.

*Journal of Food Science* 42 (4) 1046-1048 (1977) [6 ref. En] [Swift & Co., Res. & Development Cent., Oak Brook, Illinois 60521, USA]

A series of 7 tests was conducted to establish a base line for the inhibition of clostridium botulinum by nitrite in a perishable canned meat product (comminuted cured pork). The product was subjected to abusive storage at  $27^\circ\text{C}$ . The degree of variation in swell times and rates among the tests was determined. Predicted average times to first swell were 6.7, 29.8, 82.6 and 94.3 days when 0, 50, 100 and  $156 \mu\text{g NaNO}_2/\text{g}$  were added to the meat. The primary effect of nitrite appears to have been in determining the length of the lag phase. Once swelling commenced, the rate at which the cans swelled was not significantly different at 50, 100, and  $156 \mu\text{g NaNO}_2/\text{g}$ . This information will be used to evaluate additives for controlling botulinal growth and toxin production under the conditions described. IFT

## 5

[The possibility of using smoke concentrates in canned meat.]

Trumic, Z.; Djordjevic, M.; Masic, N.

*Tehnologija Mesa* 17 (12) 355-357 (1976) [Sh. en] [Jugoslovenski Inst. za Tehnologiju Mesa, Belgrade, Yugoslavia]

Problems occur in using smoke concentrate in sterilized comminuted meat products (e.g. luncheon meat). A study was made of the effect of adding 0.1, 0.3, 0.6, 1.0 or 1.5% of smoke concentrate (Etol-8027) to the meat. It was shown that: adding 0.1-0.2% imparted a fuller, appealing flavour, with no effect on smell; 0.2-0.4% had little effect on smell and taste; 0.4-0.8% enhanced the taste and smell, making the properties of the product similar to those of smoked meat; and additions of  $> 0.8\%$  made the products similar to over-smoked meat as regards smell and taste. STI



## 6

[The possibility for use of smoke concentrates in the manufacture of semi-preserved canned pork and veal.]

Modic, P.; Dimitrijevic, D.; Gobec, S.; Kuhar, J. *Tehnologija Mesa* 17 (12) 352-355 (1976) [Sh, en] [Jugoslovenski Inst. za Tehnologiju Mesa, Belgrade, Yugoslavia]

Studies were conducted on flavouring of canned pork and veal products (especially ham and pork shoulder) with smoke concentrate. The smoke concentrate is mixed with brine before injection into the meat at levels of 0.5-0.6 and 0.4-0.5% smoke concentrate (meat wt. basis) in pork and in veal resp. Results show that use of these concn. of smoke concentrate is highly satisfactory with pasteurized products; with sterilized products, slightly higher concn. ( $\leq 0.7\%$ ) are necessary. STI

## 7

[Sterilized meat preserves. 'Pork goulash' (prepared dish).]

Bulgaria, D'rzhaven Komitet za Standartizatsiya *Bulgarian Standard* BDS 13334-76, 6pp. (1976) [Bg] [Sofia, Bulgaria]

Prepared pork goulash is made from pork (chilled fresh or defrosted frozen, fat content  $\leq 10\%$ ), broth, sunflower seed oil, various types of vegetables, wheat and condiments. The canned product shall meet the following requirements: meat content,  $\geq 35\%$  with  $\leq 65\%$  liquid (sauce); total fat content,  $\leq 35\%$ ; K, Pb and As,  $\leq 100$ , 0.3 and 0.2 mg/kg, resp.; and  $\leq 10$  saprophytic and sporeforming aerobes/g; there is no tolerance for pathogens, anaerobes, non-sporeformers and moulds. The product shall be stored at 0-15°C; shelf life is  $\leq 2$  yr from date of manufacture. HBr

## 8

[Microbiological condition of sausages packaged in laminated plastics.]

Aubert, S. d'; Cremagnani, A.; Soncini, G.; Cantoni, C.

*Imballaggio* 28 (257) 57-58 (1977) [4 ref. It] [Istituto di Ispezione degli Alimenti di Origine Animale, Univ. degli Studi di Milano, Milan, Italy]

(i) 600 retail samples of sausage (wurstel) packaged in laminated plastics cans and (ii) 600 packaged in jars or metal cans were analysed for composition of their bacterial flora. Total counts for (i) ranged from  $< 10^2$  to  $10^{10}$ /g, the main ranges being  $10^3$ - $10^4$  to  $10^7$ - $10^8$ /g (85%); group D streptococci ranged from 0 (34.34%) to  $10^6$ - $10^7$ /g (2.02%), the other main ranges being  $10^2$ - $10^3$  and  $10^3$ - $10^4$  (52%); *Escherichia coli* + coliforms ranged from 0 (54.14%) to  $10^4$ - $10^5$ /g (1.74%), the other main ranges being 0- $10^2$  and  $10^2$ - $10^3$ /g (43%); coagulase-positive staphylococci ranged from 0 (72.72%) to  $10^2$ - $10^3$ /g (9.09%), the remainder being in the 0- $10^2$ /g range; and sulphite-reducing clostridia were present only in the 0- $10^2$ /g range (34.92%). The (ii) samples were sterile. The results are discussed from the retail spoilage viewpoint. HBr

## 9

[The effect of smoke concentrate on the internal surface of tinsplate containers.]

Simic, N.; Dordevic, G.

*Tehnologija Mesa* 17 (12) 376-377 (1976) [Sh, en] [Jugoslovenski Inst. za Tehnologiju Mesa, Belgrade, Yugoslavia]

Studies on effects of smoke concentrates on the inside surfaces of cans of the type used for canned meat products are described. No adverse effects were observed on cans with an interior coating of gold lacquer or varnish containing Al pigment. STI

## 10

[Methods for improvement of the resistance of sterilized sausages to bursting during reheating.]

Einflussmöglichkeiten auf die Platzfestigkeit von sterilisierten Würstchen beim Wiedererwärmen. Reichert, J. E.

*Fleischerei* 28 (4) 67-68, XIV; (5) 35-37, XII (1977) [3 ref. De, en, fr] [Tungendorfer Strasse 93A, D-2350 Neumünster, Federal Republic of Germany]

Factors influencing bursting of canned Frankfurters and similar sausages during reheating are discussed, with reference to experimental and literature data. It is concluded that the incidence of bursting is increased by incorporation of milk protein, starch or high levels of fat or collagen in the emulsion, tight filling of the casings, excessive smoking, and high sterilization temp.; incidence of bursting may be reduced by slack filling, incorporation of a large proportion of ice or water in the emulsion, efficient cooling and drying after smoking, and avoidance of overfilling of the can. AJDW

## 11

[Protein content of the fat-free material in meat products.]

Simonffy, Z.; Takacs, J.; Vida, L. P. B.

*Husipar* 26 (1) 10-13 (1977) [3 ref. Hu, en, de, ru] [MEM Elemiszeripari Higieniai Ellenörző Szolgálat, Központi Lab., Soroksari út 58, 1095 Budapest, Hungary]

Data are given for the composition of (i) 44 samples of canned ham, (ii) 28 samples of canned pork shoulder, (iii) 13 samples of mortadella sausage and (iv) 23 samples of canned moulded ham. Mean values for (i), (ii), (iii) and (iv) were, resp. (%): protein in fat-free material 20.04, 19.26, 19.22 and 19.56; NaCl 3.13, 3.02, 2.58 and 2.88; moisture 74.20, 73.60, 58.72 and 72.55; and fat 1.45, 3.14, 21.53 and 4.12. These values comply with and in some cases are superior to FAO/WHO Codex Alimentarius requirements. AJDW

## 12

[Meat preserves. Smoked pasteurized bacon in slices.]

Union of Soviet Socialist Republics, Gosudarstvennyi Komitet Standartov



**Soviet Standard GOST 9167-76.** 3pp. (1976)  
[Ru]

This standard applies to salted and smoked bacon slices from the belly of carcass halves, canned and pasteurized. The product shall contain 2.5-3.5% salt,  $\leq 100$  mg sodium nitrite/100 g,  $\leq 100$  mg Sn salts (in terms of Sn)/kg, and no Pb salts or foreign admixtures. The standard also covers packaging, transport (refrigerated vehicles at 0-5°C) and storage ( $\leq 75\%$  RH at 0-5°C; shelf life is 6 months). HBr

### 13

**'Island brands' of food - a case for international standards.**

Siegenthaler, E. J.; Harwood, B.

*Ecology of Food and Nutrition* 6 (3) 183-186 (1977) [3 ref. En] [School of Public Health, Univ. of Michigan, Ann Arbor, Michigan, USA]

In many parts of the world, the imported food offered for sale is not up to the standards normal in countries with a highly developed system of legislation and control. An example of this is the 'Island brand' of food manufactured for trade in the South Pacific. Seven samples of canned corned beef acquired on various Pacific islands and originating from 5 different countries were evaluated, together with 2 samples from Paraguay but acquired in the USA. Tabulated results for the 'Island brand' products showed that by US Federal Standards, all 7 contained excess water (41.2-63.0%), excess fat (19.5-41.1% in 6 samples, only 1 sample with  $< 18\%$ , i.e. 14.7%), and low protein (10.6-23.0%); several samples contained visible connective tissue, arteries and ligaments, and pieces of hair. None represented a health hazard and the canning process was acceptable. A case is made for international min. acceptable quality standards. RM

### 14

**[Electrophoretic identification of foreign proteins, especially soy proteins, in fresh or canned meat products.] [Lecture]**

Homayounfar, H.

*Annales de la Nutrition et de l'Alimentation* 31 (2) 187-192 (1977) [6 ref. Fr] [Inst. Appert, 44 Rue d'Alesia, 75014 Paris, France]

A previously published method [see Homayounfar, *Cahiers de Nutrition et de Dietetique* (1975) 4 37] for detecting soy proteins in meat products by test tube acrylamide gel electrophoresis is described. The detection is facilitated by heat treatment, which reduces the animal protein bands e.g. 70 min autoclaving at 117°C considerably reduces the animal protein bands of pasteurized ham or sausage and allows detection of 1-2% soy proteins, though additional alkali treatment is necessary for corned beef. The presence of soy isolate and textured vegetable protein in a variety of meat products, and electropherograms of milk, wheat and textured field

bean proteins and of promine D (soy isolate) are shown in photographs. [See FSTA (1978) 10 4A214.] RM

### 15

**The application and limitation of immunochemical analyses in the estimation of soya protein in meat products. [Lecture]**

Llewellyn, J. W.; Sawyer, R.

*Annales de la Nutrition et de l'Alimentation* 31 (2) 157-159 (1977) [6 ref. En] [Lab. of the Gov. Chemist, Cornwall House, Stamford Street, London LE1 9NQ, UK]

Antisera were produced from heated (30 min at 121°C) and unheated soya protein isolate and tested against a wide range of cooked and uncooked products containing soya protein using double diffusion technique of Ouchterlony's [Progress in Allergy 1962, 6 30-154]. Examination of 50 soya products produced only 1 anomalous negative result. No difference in sensitivity between 'heated' and 'unheated' antisera was apparent with uncooked soya products, though 'heated' antiserum was more sensitive to products cooked for 1 h at 121°C. Some extruded soya-wheat mixtures gave positive results with both antisera, both raw and cooked. Positive responses were obtained with strong extracts (2 g/20 ml) of rice, maize, onion powder, cardamom, nutmeg, cinnamon and coriander, but not with more normal weak extracts (0.4 g/20 ml). Strong cross reactions were noted with rapeseed, peanuts, peas, haricot and field beans; no cross reactions with meats, egg powder, milk powder, wheat flour and starch were observed. The method successfully detected soya protein in pork pies, canned or frozen meat products without prior freeze-drying or defatting. The Mancini method [in Protides in Biological Fluids, Colloquium Proceedings 1964, 11 370-373] gave unacceptably variable results. [See FSTA (1978) 10 4A214.] RM

### 16

**Analysis of soya proteins in commercial meat products by polyacrylamide gel electrophoresis of the proteins extracted in 8M-urea and 1% 2-mercaptoethanol. [Lecture]**

Guy, R. C. E.; Willcox, C. J.

*Annales de la Nutrition et de l'Alimentation* 31 (2) 193-199 (1977) [7 ref. En] [J. Lyons Cent. Lab., 149 Hammersmith Road, London W14 0QU, UK]

The reproducibility of the previously described method [see FSTA (1974) 6 3S371] of detecting soy proteins in meat products, and possible interference from other ingredients were investigated. Beefburgers prepared with 20% added soy proteins and the other ingredients were analysed raw and after autoclaving for 40 min at 110°C. Tabulated results showed that the major interfering agents were onion and mushroom powder, especially after autoclaving. However, the min. levels required to cause interference were 5 and 3% (onion), 10 and 4% (mushroom) for raw and



autoclaved samples, resp., vs. 2-3% normally used. The smaller effects observed with collagen, blood plasma and egg solids would be similarly reduced to insignificant levels in normal usage. The method of soy analysis by extraction in 8M urea and 1% 2-mercaptoethanol at pH 8.6 in 0.06M tris glycine buffer followed by polyacrylamide electrophoresis was found to be reproducible and free from serious interference for analysis of commercial products. For canned products an autoclaved standard should be used. The major problem in analysis of unknown products is the extraction of soy proteins without affecting the electrophoretic separation and densitometry. [See FSTA (1978) 10 4A214.] RM

## 17

**Application and limitation of isoelectric focusing and high performance chromatography in the estimation of soya proteins in meat products.** [Lecture]

Llewellyn, J. W.; Sawyer, R.

*Annales de la Nutrition et de l'Alimentation* 31 (2) 231-232 (1977) [3 ref. En] [Lab. of the Gov. Chemist, Cornwall House, Stamford Street, London SE1 9NQ, UK]

Isoelectric focussing was applied to laboratory-prepared pork sausages containing known amounts of soy protein isolate. Samples were heated at 100°C for 15 min to render the pork insoluble. Freeze-dried defatted samples were extracted with urea and 2-mercaptoethanol, analysed on 4.5% (pH 3.5-10) polyacrylamide thin slab gels with 6M urea at 5°C, 20 W for 3 h, stained with bromophenol blue, and band intensities measured by scanning microdensitometry. Using soy protein isolate standards, 5% added soy (fresh sausage wt.) was determined with a relative accuracy of  $\pm 20\%$  (i.e.  $5 \pm 1\%$  in sausage). After severe heat treatment (as in canning or baking) soy proteins became insoluble in urea-mercaptoethanol. For high performance chromatography, acetate buffer (pH 5.0, 0.05M) extracts were analysed on a 50 cm column of pellicular weak anion exchange resin at  $\leq 70$  kg/cm<sup>2</sup> and detected by UV absorption at 254 nm. Measurement of the peak area of one soy protein component fully separated from the meat allowed quantitation with a relative accuracy of  $\pm 15\%$ , but the column life was short. Soy protein in canned and baked products was poorly extracted with the acetate buffer, preventing accurate detn. [See FSTA (1978) 10 4A214.] RM

## 18

**[Problems of determination of the shelf-like of canned delicatessen meat products.]**

Kolomiets, M.

*Myasnaya Industriya SSSR* No. 12, 33-36 (1976) [Ru] [Vses. Nauchno-issled. Inst. po Problemam Khraneniya Materialov i Tovarov, USSR]

Batches of 7 types of canned meat product (including a semi-manufactured sausage product, a semi-manufactured salami product, and liver paste

with lard) were stored at 8.0-8.6°C; some samples were artificially aged at 37° or 50°C for 12-30 months. After storage the canned products were sampled according to Soviet Standard GOST 8756-58, and quality was evaluated. The quality of the stored products generally corresponded to the appropriate standards. Methods for detn. of the shelf-life of canned meat products (in relation to storage temp.) are outlined. It is concluded that canned meat products may be stored for 3-5 yr. STI

## 19

**Method for the determination of nitrosopyrrolidine in meat and meat products at the 1 µg/kg level by means of gas chromatography-electron capture detection.** [Lecture]

Kubacki, S. J.; Borys, A.

*IARC Scientific Publications* No. 14, 109-116 (1976) [10 ref. En] [Dept. of Instrumental Analysis, Inst. of the Fermentation Ind., Warsaw, Poland]

Modifications to the method of Telling et al. [see *IARC Scientific Publications* (1974) No. 9, pp. 12-17] allows detn. of nitrosopyrrolidine (NPy) at the 1 µg/kg level with about 56% recovery and a coeff. of variation about 22%. Replacement of steam distillation simplifies the technical aspects and shortens the duration of this stage without decreasing its efficiency. Modifications to the gas chromatographic-electron capture detection procedure reduce NPy retention time to about 8 min. Replacement of the 1% solution of dichloromethane in n-pentane by a 20% solution during rinsing of the alumina column results in a higher degree of purity of the eluate and thus in a higher specificity of the method. Results of analyses of standard NPy solution and 2 meat samples spiked with 1 or 60 µg/kg NPy, and recoveries of NPy from samples of canned meat with or without 50% added fat, are presented. [See FSTA (1978) 10 5C147.] AL

## 20

**[Variability of losses during sterilization of beef goulash.]**

Lostrek, M.; Kuhar, J.

*Tehnologija Mesa* 18 (7/8) 228-231 (1977) [6 ref. Sh, en] [Mesna Ind., Murska Sobota, Yugoslavia]

Considerable wt. losses of the meat may occur during sterilization of beef goulash in cans; wt. losses vary over the range 24-36%, depending on the type of beef. Variability of losses is attributed to differences in the quantity of fat and connective tissue in the meat. STI

## 21

**[Bacterial antagonism and its use in preservation of cooked meat products.]** Bakterielle Gegenwirkung - ihre Anwendung bei der Konservierung von gekochten Fleischprodukten.

Pina, J. G.



**Fleischerei** 28 (10) 43-44, 46, 50, 53 (1977) [De]  
[Lab. Miret S.A., Barcelona, Spain]

Antagonism between bacteria is discussed, with special reference to inhibitory activity of lactic acid bacteria (attributable to acidification, alterations in redox potential, synthesis of antibiotics, removal of essential nutrients from the medium, and formation of  $H_2O_2$ ). A summary is given of a series of studies on effects of addition of 'Starlac' (a mixed *Pediococcus cerevisiae* B-2/*Micrococcus* strain MF-1 culture) to the curing brine on the microflora and shelf-life of canned cured ham and pork shoulder. Tables are given for the microbial quality and pH of samples with Starlac, with chemical preservatives, or without either Starlac or preservatives. The results show that Starlac exhibited a significant inhibitory activity against the spoilage microflora; effects of Starlac were, in some cases, better than those of chemical preservatives. AJDW

## 22

[Sterilized canned meats. Meat balls in white sauce, oriental style and stewed (prepared dishes).]  
Bulgaria, D'rzhaven Komitet za Standartizatsiya  
*Bulgarian Standard* BDS 13336-76, 9pp. (1976)  
[Bg]

This standard lays down the basic ingredients of the 3 types of meat ball listed in the title. Total fat content shall be  $\leq 16\%$ ; contents of Sn, Pb and As,  $\leq 100$ ,  $\leq 0.3$  and  $\leq 0.2$  mg/kg, resp.; and contents of saprophytic sporeforming anaerobes  $\leq 10/g$ . No pathogens, anaerobes, non-sporeformers and moulds are permitted. The standard also covers sampling, testing, packaging (cans), storage (dry ventilated rooms at  $0-15^\circ C$ ) and shelf life (up to 2 yr). HBr

## 23

The Hi-Cone multi-pack.  
Anon.

*Soft Drinks Trade Journal* 31 (2) 60-61 (1977)  
[En]

The Hi-Cone multi-pack machine for canned soft drinks and beer is described. Machines can handle  $\leq 1800$  cans/min, and it has equipment to handle can line speeds associated with medium speed lines. Another machine in the range can handle line speeds  $\leq 720$  cans/min. The system is extremely flexible, some machines can handle a range of can heights. The Hi-Cone is a reliable multi-packaging system - no heat or glueing is required. Flat packaging takes up the min. of storage space and the system offers consistently high production efficiencies. Hi-cone packaged canned beer can be stacked on open trays due to greater stability in can handling and palletisation. One man can handle both a Hi-Cone unit and a case packer at speeds  $\leq 1800$  cans/min. Hi-Cone is also economical and machinery is available on a rental basis. SP

## 24

A public health perspective of microbial standards for meats.

Gangarosa, E. J.; Hughes, J. M.

*Association of Food and Drug Officials, Quarterly Bulletin* 41 (1) 23-28 (1977) [12 ref. En]  
[Bacterial Diseases Div., Bureau of Epidemiology, Cent. for Disease Control, Atlanta, Georgia, USA]

Some authorities in the USA have proposed microbial standards for meats at the time of purchase; in particular, ground beef, sliced luncheon meat and frankfurters have been considered for control. Data presented indicate that these foods have, in fact, a very good safety record, and the immediate cause of the outbreaks of disease caused by them is usually mis-handling by food service industries and the consumer. Microbial standards are not considered to be an effective means of improving the safety of these products. JRR

## 25

[Basic principles of heat-preservation.] Grundlagen der Hitze-konservierung.  
Reichert, J. E.

*Fleischerei* 29 (1) 42-46 (1978) [De]  
[Fachhochschule Lippe, Liebigstrasse 87, D-4920 Lemgo 1, Federal Republic of Germany]

Definitions are given of terms of importance for heat-preservation of foods (including water activity, pH, pasteurization, sterilization, and  $D$ -,  $Z$ -,  $Q_{10}$ ,  $F$ -,  $E$ - and  $C$ -values); their significance in relation to the intensity of heat treatment is discussed. Tables of data are given showing: the relationship between water activity and moisture content of various foods; water activities of canned meat products; characteristics of spoilage by various microorganisms; and  $D$ -values for various organisms. AJDW

## 26

[The composition of beef in its own juice and its pesticide content based on the tolerances for food of animal origin.] Die Zusammensetzung von Rindfleisch im eigenen Saft und der Gehalt an Pestiziden auf Grund der

Höchstmengenverordnung tierischer Lebensmittel.  
Langner, H. J.; Flessas, E.

*Fleischwirtschaft* 56 (12) 1799-1802 (1976) [De, en, fr] [Inst. für Lebensmittelhygiene, Freie Univ., Koserstrasse 20, 1000 Berlin (West) 33]

155 samples of canned beef in its own juice stored over long [unspecified] periods were analysed by ISO methods; results are tabulated. The following mean values (with ranges in parentheses) were obtained: water  $58.88 \pm 3.18\%$  (50.0-65.1), fat  $21.47 \pm 3.42\%$  (12.1-30.1), protein  $17.73 \pm 1.15\%$  (14.1-24.0), connective tissue protein  $21.92 \pm 3.69\%$ , connective tissue protein-free meat protein  $13.90 \pm 1.41\%$  (10.0-22.0). Only 1 sample exceeded the tolerance for pesticide residues. The following limiting values are suggested: protein min. 16%, connective tissue protein-free meat protein min. 12%, fat max. 24%. RM



## 27

[Equipment for rationalization of can filling.]

Maschinen zur Rationalisierung des Abfüllvorganges in Dosen.

Bakker, A. F.

*Fleischerei* 29 (2) 37-38, V-VI (1978) [De, en, fr, es]

Methods and equipment for filling cans with meat and meat products are described, with special reference to can-filling machines of the types VI, V58/6 and V58/9 (throughputs 60, 60-90 and 120 500-g cans/min, resp.). A flow diagram of a can-filling line is given. AJDW

## 28

Cryogenic gamma irradiation of prototype pork and chicken and antagonistic effect between *Clostridium botulinum* types A and B.

Anellis, A.; Shattuck, E.; Morin, M.; Srisara, B.; Qvale, S.; Rowley, D. B.; Ross, E. W., Jr.

*Applied and Environmental Microbiology* 34 (6) 823-831 (1977) [44 ref. En] [Food Sci. Lab., US Army Res. & Development Command, Natick, Massachusetts 01760, USA]

Inoculated, irradiated pork (2 300 cans) and chicken (2 000 cans) pack studies were performed to establish the 12D dose for these foods. Each can was inoculated with a mixture of  $10^6$  spores of each of 10 strains of *Clostridium botulinum* (5 type A and 5 type B), or a total of  $10^7$  spores. The cans received a series of increasing doses of  $\gamma$  rays ( $^{60}\text{Co}$ ) at  $-30 \pm 10^\circ\text{C}$ ; they were incubated for 6 months at  $30 \pm 2^\circ\text{C}$  and examined for swelling, toxicity, and recoverable botulinal cells. The highest rate of swelling, for both foods occurred within the first wk of incubation, and max. swelling was observed within 4 to 5 wk. The minimal experimental sterilizing dose (ESD) based on flat, nontoxic sterile cans was  $3.0 < \text{ESD} \leq 3.2$  Mrad for pork and  $4.0 < \leq 4.2$  Mrad for chicken. An analysis of the partial spoilage data by extreme-value statistics indicated, with 90% confidence, that the rate of spore death in the 2 foods was not a normal distribution, but appeared to favour a shifted exponential function. Based on the latter distribution, and assuming 1 most resistant strain in the mixture of 10 used, the 12D dose computed to 4.37 Mrad with a shoulder of 0.11 Mrad, for pork and to 4.27 Mrad, with a shoulder of 0.51 Mrad, for chicken. An assumption that there were 2 or more most resistant strains in the inoculum progressively lowered the 12D dose. There was an apparent antagonism between the irradiated type A and B viable strains in the 2 foods. Cans with type B cells and toxin predominated over cans with type A cells and toxin, but cans with a mixture of type A and B toxins predominated over cans with a mixture of type A and B cells. At the highest sublethal doses, only type A cells survived in pork, but in chicken there was at least type B strain that was at least as resistant as type A strains. AS

## 29

[Utilization of slaughter by-products for the manufacture of canned meat products.]

Oreshkin, E. F.

*Myasnaya Industriya SSSR* No. 9, 17-18 (1977)

[Ru] [Vses. Nauchno-issled. Inst. Myasnoi Promyshlennosti, USSR]

Utilization of offal (stomachs, spleens, heads, etc.) in canned and other meat products is discussed with reference to offal-containing pressed sausages, partial substitution of spleen for liver in liver sausage, and stewed offal products. Use of blood in meat products is discussed, together with utilization of plant, milk and soybean proteins. STI

## 30

Enhancing nitrite inhibition of *Clostridium botulinum* with isoascorbate in perishable canned cured meat.

Tompkin, R. B.; Christiansen, L. N.; Shaparis, A. B.

*Applied and Environmental Microbiology* 35 (1) 59-61 (1978) [11 ref. En] [Swift & Co., Res. & Development Cent., Oak Brook, Illinois 60521, USA]

Perishable canned comminuted cured pork was formulated with salt, water and sugar, inoculated, processed and chilled. 0.02% (meat wt. basis) sodium isoascorbate and 0, 50 or 156  $\mu\text{g/g}$  (meat wt. basis)  $\text{NaNO}_2$  were added. Cans of meat were inoculated with 5 type A (33A, 36A, 52A, 77A and 12885A) and 5 type B (ATCC 7949, 41B, 53B, 213B and Lamanna B) strains of *Clostridium botulinum*, using a target level of 100 spores/g of product. 25 cans of inoculated product/test variable were incubated at  $27^\circ\text{C}$  for  $\leq 110$  days and removed as they swelled. Spore levels, toxin assays and chemical composition were determined. Addition of sodium isoascorbate to perishable canned comminuted cured meat markedly enhanced the efficacy of nitrite against *Clostridium botulinum*. It was found that initial addition of 50  $\mu\text{g NaNO}_2/\text{g}$  isoascorbate was as effective as 156  $\mu\text{g NaNO}_2/\text{g}$  alone. SP

## 31

Characterization of volatile flavor constituents of beef stew.

Peterson, R. J.

*Dissertation Abstracts International*, B 38 (2) 575: Order No. 77-17559, 171pp. (1977) [En] [Rutgers Univ., New Brunswick, New Jersey 08903, USA]

Volatile flavour constituents of fresh, frozen beef stew were isolated by flash vaporization, extraction of the aqueous volatiles with ethyl ether, concentration of the extract and repeated gas chromatography with different stationary phases until pure fractions were obtained. Fractions were identified using an IR-MS combination. 132 compounds were positively or tentatively identified. The flavour of fresh, frozen stew was not due to any



single constituent. Comparison with volatile compounds from canned stew showed that frozen stew contained more alcohols, 2-alkenals, esters, lactones and ionones and less hydrocarbons and N- and S-containing heterocycles than canned stew. Addition of a mixture of pyridine (1.2 p.p.m.), 2,4,5-trimethyloxazole (1.2 p.p.m.) and benzothiazole (0.45 p.p.m.) to fresh, frozen beef stew or canned beef stew gave an undesirable flavour note. The 3 compounds are found exclusively or to a greater extent in canned beef stew volatiles. DIH

### 32

[Optimal pattern of sterilization of canned products in rotating autoclaves.]

Khlebnikov, V. I.; Bobrikova, E. G.; Kakhorov, M. K.; Nazarov, V. D.; Ryakhovskii, I. P.

*Myasnaya Industriya SSSR* No. 1, 31-33 (1977)

[7 ref. Ru] [Nauchno-proizvodstvennoe Ob'edinenie Ptitsepererabaty-vayushchei i Kleezhelatinovoi Promyshlennosti 'Kompleks', USSR]

The rate of heating of chicken meat (in 20 × 20 × 20 mm cubes) in 250 ml cans increases with increasing proportion of liquid phase and increasing rotation rate. Heating is accelerated by agitation of the water in the autoclave and of the can contents. Rotation rates ≥ 15 rev/min cause clouding of the juice; at 25-30 rev/min, the meat cubes disintegrate. 15 rev/min gives optimal results. Effects of headspace vol. (6, 8, 10 or 12%) were evaluated in studies using 250 ml cans (with 20% liquid phase) sterilized at 130°C, 15 rev/min. The results show that heating rate tends to increase with increase in headspace vol. Increasing the headspace vol. by 1% increases heating rate by approx. 2.5% over the range studied. Sterilization at 135°C, which gave rapid processing, resulted in tough meat which was difficult to remove from the bones. Meat sterilized at 125°C was similar to that cooked normally, and was free of 'sterilized meat' off-flavour. STI

### 33

Comparative study into the substances related to the flavour of canned meat products manufactured from meat of pigs fattened using industrial and common methods. [Lecture]

Vasilev, K.; Danchev, S.; Kostov, K.

*Proceedings of the European Meeting of Meat Research Workers* No. 23, F7:1-F7:17 (1977)

[12 ref. En, Ru] [Higher Inst. Food Ind., Plovdiv, Bulgaria]

Comparative studies on the free amino acids and carbohydrates contents of canned meat products (ham, shoulder and fillet) indicated that the total amount of free amino acids was higher in canned products manufacture from meat of pigs fattened by common (non-intensive) methods. [See FSTA (1978) 10 8S1048.] STI

### 34

[Justification of sterilization temperature for canned homogenized poultry meat, based on biological evaluation.] [Lecture]

Gonotskii, V. A.; Korotaeva, M. M.; Petrovskii, K. S.; Terekhin, S. P.; Khovaeva, L. A.; Chvanenko, I. I.

*Proceedings of the European Meeting of Meat Research Workers* No. 23, G2:1-G2:9 (1977) [3 ref. Ru, De] [Nauchno-issled. Ob'edinenie Ptitsepererabatyvayushchei i Kleezhelatinovoi Promyshlennosti 'Kompleks', Moscow, USSR]

The effect of sterilization on the biological value of chicken meat and canned homogenized chicken meat heated to 115°, 120°, 125°, 130° or 135°C was studied. Sterilization temp. were established for canned homogenized poultry meat, giving maximum retention of nutritive value. [See FSTA (1978) 10 8S1048.] STI

### 35

[Experiments with the application of HTST heating during stationary sterilization of meat cans.]

[Lecture]

Baichev, I.

*Proceedings of the European Meeting of Meat Research Workers* No. 23, G5:1-G5:10 (1977)

[12 ref. Ru] [Inst. of Meat Ind., Sofia, Bulgaria]

Experiments were conducted into application of high temp. sterilization under stationary conditions. A special autoclave basket was designed for this purpose; temp. changes inside the cans were measured during heating. Conditions for gradual sterilization at temp. ≤ 130°C (with considerably reduced heating times) were established. Tests with finished products showed improved quality of the products, as well as higher efficiency of the process. [See FSTA (1978) 10 8S1048.] STI

### 36

Investigation into sterilization of canned comminuted meat by mathematical nomogrammic methods. [Lecture]

Todorovic, M.

*Proceedings of the European Meeting of Meat Research Workers* No. 23, G6:1-G6:13 (1977)

[14 ref. En, Ru] [Fac. of Tech., Univ. Novi Sad, Yugoslavia]

The graphical nomogrammic method according to Olson & Stevens [Food Research (1938) 4, 1] was used for calculation of the optimal sterilization conditions for canned comminuted meat. This method was found to be inadequate, and did not give the anticipated results. Mathematical modification of the method permitted satisfactory calculation of optimum sterilization conditions. [See FSTA (1978) 10 8S1048.] STI

### 37

[The microflora and some biochemical properties of pasteurized meat products inoculated with enterococci and gamma-irradiated and long-term stored at room temperature.] [Lecture]



Stoichev, M.; Bailezov, D.; Dzhezheva, G.; Tsoleva, L.

*Proceedings of the European Meeting of Meat Research Workers* No. 23, L7:1-L7:19 (1977) [9 ref. Ru, De] [Inst. of Microbiol. of the Bulgarian Acad. of Sci., Sofia, Bulgaria]

Canned meat products of the pressed pork type, inoculated with *Streptococcus faecalis* ( $2 \times 10^5$ - $3.5 \times 10^6$ /g) in the exponential and stationary phases of development were pasteurized at 65.5°C for 30 min and subsequently  $\gamma$ -irradiated with 0.05 and 0.2 Mrad. The products were then stored at room temp. for 30 months. No blown cans were found. The inoculated enterococci maintained their activity in relation to the irradiation dose applied, and their action inhibited the growth of other microorganisms; this considerably improved the keeping quality of the canned products at room temp. With higher irradiation doses, an increase in the content of soluble proteins and free SH-groups in the pasteurized products was noticed. No significant sensory changes were observed. The method was recommended as suitable for improvement of the keeping quality of pasteurized products of the pressed pork type. [See FSTA (1978) 10 8S1048.] STI

### 38

Inhibition of *Clostridium botulinum* with nitrite in meat products. [Lecture]

Lee, S. H.; Cassens, R. G.; Sugiyama, H.

*Proceedings of the European Meeting of Meat Research Workers* No. 23, L14:1-L14:20 (1977) [16 ref. En, Ru] [Muscle Biology Lab., Univ. of Wisconsin, Madison, Wisconsin, USA]

Various amounts (0, 50, 100, 150, 200 or 300 p.p.m.) of nitrite were added to ground pork, which was then canned and heated at 90°, 100° or 110°C. Silver lactate was used to block endogenous sulphhydryl groups in some meat samples before the addition of nitrite. Inhibition was studied by inoculating spores of *Clostridium botulinum* into cans containing little nitrite and stored for 8 wk, or into meat homogenates prepared from canned meat and adjusted to 30 p.p.m. nitrite content. Swelling was observed in cans stored at 22°C and gas production was observed in homogenates stored at 30°C. In both cases nitrite caused inhibition. The inhibition was greater if increased levels were added initially to the meat, and it was lowered in meat stored for 6 wk compared with that stored for 1 day. Similar results were obtained from meat treated with silver ions to block endogenous sulphhydryl groups. This indicates that sulphhydryl groups are not necessary for formation of the inhibitor in cured meat products. [See FSTA (1978) 10 8S1048.] STI

### 39

Residues of organochlorine pesticides in pork tissue and in canned pasteurized pork products. [Lecture]

Visacki, V.; Raseta, J.; Spiric, A.

*Proceedings of the European Meeting of Meat Research Workers* No. 23, P1:1-P1:15 (1977) [8

ref. En, Ru] [Veterinary Fac., Belgrade, Yugoslavia]

A total of 1872 samples of muscle and fat tissue, livers and kidneys of 468 hogs as well as 276 samples of canned pasteurized pork were investigated. The samples studied were most frequently contaminated with DDT residues (including metabolites), followed by  $\alpha$ - and  $\gamma$ -BHC residues. Dieldrin, heptachlor epoxide and  $\beta$ -BHC were found in a small proportion of samples, and in very small quantities. The qualitative and quantitative differences in isomers and metabolites of DDT in various tissues of individual animals are discussed. [See FSTA (1978) 10 8S1048.] STI

### 40

[Basic principles of sterilization of canned meat products. I.] Grundlagen der Sterilisation von Fleischkonserven. I.

Sielaff, H.; Schleusener, H.

*Fleisch* 31 (12) 236-238 (1977) [De] [Humboldt- Univ., Berlin (GDR)]

Processes normally used for sterilization of canned meat products are described. Endogenous and exogenous factors influencing heat resistance of microorganisms are discussed. Heat-activation of bacterial endospores (by sublethal heating) may be used, e.g. for fractionated pasteurization of semi-preserved scalded sausage products. Exogenous factors influencing heat resistance include acid content, salts, inhibitory substances, other constituents, water activity, and dry or moist heat. In general, at pH values >4.5, long sterilization times are required because of the increased heat resistance of sporeforming organisms. These organisms are less heat resistant under more acid conditions. The importance of water activity for heat resistance is discussed, using canned liver sausage containing 44% fat and 2.5% NaCl, (water activity 0.95) as an example. After mild heat treatment and several wk of incubation, this product showed no decomposition. Fats and oils in foods give microorganisms relatively great protection against high temp. Spices may reduce heat resistance of microorganisms. IN

### 41

[Comparative study of the biological value of horsemeat preserves.]

Koval', V. A.; Ignat'ev, A. D.

*Myasnaya Industriya SSSR* No. 7, 31-32 (1977) [7 ref. Ru] [Vses. Nauchno-issled. Inst. Zhivotnovodstva, USSR]

Feeding trials (using rats) were conducted on 'Antrekot' and 'Rulet' canned horsemeat products. The results show that wt. gain was greater with 'Antrekot' than with 'Rulet'. Although nutritionally superior, the protein in 'Antrekot' is more difficult to assimilate than that in 'Rulet'. 'Antrekot' contains 4% more protein and half the amount of fat as compared to 'Rulet'. STI



## 42

[Effect of processing on thiamin content of sterilized pig meat.]

Janitz, W.; Rdesinska, L.

*Medycyna Weterynaryjna* 33 (8) 499-501 (1977)

[8 ref. Pl, ru, en] [Katedra Tech. i Higieny Żywnienia Człowieka, Wydział Tech. Żywności, AR, Poznań, Poland]

Longissimus dorsi muscles from Polish Large White pigs slaughtered at 120-kg live wt. were cut transversely into 3 parts, pairs of each part either treated further directly, or stored for 7 days at 4°C (meat with marked autolytic changes), or stored for 2 days at 4°C, frozen at -20°C, held at -18°C for 21 days and defrosted at room temp. for 6 h (defrosted meat). In further treatment, each part was ground to pass a 2-mm mesh, and the ground meat was divided into 6 portions of which 1 served as control and 5 were pickled for 18 h at 8°C in a pickle of 2.5 g NaCl and 11 mg NaNO<sub>2</sub>/100 g meat, 0.4 g polyphosphate ('Hamine') being then added/100 g; 4 of the pickled portions received further additions of resp. 0.4 g gelatin, 0.5 g of a 2% solution of liquid smoke in lard, 5 g starch, or the 3 supplements together, all/100 g meat. All variants were canned and sterilized at 121°C for 50 min. Mean values with s.d. and significance of differences are tabulated for thiamin contents determined in 6 replicates. It is concluded that sterilization of meat canned directly after slaughter caused the greatest thiamin losses; that autolytic changes and freezing and defrosting reduced the losses; that, irrespective of autolytic changes, pickling and polyphosphate addition increased sterilization losses of thiamin; and that addition of gelatin to pickled autolysed or frozen and defrosted meat increased these losses. SKK

## 43

Effects of storage and polyphosphates on the flavor volatiles of canned poultry meat.

Rao, C. S.; Day, E. J.; Chen, T. C.

*Journal of Food Science* 43 (2) 515-516 (1978)

[9 ref. En] [MAFES, Poultry Sci. Dep., Mississippi State Univ., Mississippi 39762, USA]

The effects of storage and polyphosphates on the volatile components of canned broiler meat were investigated. The concn. of H<sub>2</sub>S, methyl mercaptan, and saturated and total carbonyls of both control and polyphosphate-treated broiler meat increased slightly upon storage. A greater increase in unsaturated carbonyls was observed for the controls than for the polyphosphate-treated samples. During storage, the general trend of increasing thiobarbituric acid (TBA) values was not affected by the presence of polyphosphates; however, the control samples had the highest TBA values throughout the observation period. All canned samples exhibited a continued increase in free NH<sub>3</sub> content as the storage time advanced. Polyphosphates also retarded the formation of free NH<sub>3</sub> in canned broiler meat during storage as compared to controls. IFT

## 44

[Examination of canned meats for food inspection purposes.] Die Untersuchung von Fleischkonserven bei der Lebensmittelkontrolle. Kendereski, S.

*Schlachten und Vermarkten* 78 (3) 80-83 (1978)

[15 ref. De, en, fr] [Inst. für Biochem. Tech., Karnedzijevo 4, 11 000 Belgrade, Yugoslavia]

The methods and results from physical and bacteriological examination of canned meats for food control purposes are discussed. Special attention is given to possible health hazards (botulism, salmonella, proteolytic saprophytes). It is suggested that 'blowing' of cans on incubation is not necessarily a sign of spoiled products: the blowing may be the result of microbial growth during incubation of previously perfect products, fit for human consumption though not for long storage. More attention to the condition of the products at the time of sampling is suggested. Precautions designed to prevent spoilt cans are summarized. RM

## 45

[Meat and meat products. Canned cooked beef (corned beef). Characteristics and packaging.]

Portugal, IGPAI Reparticao de Normalizacao *Portuguese Standard* NP 1105, 2pp. (1975) [Pt] [Avenida de Berna 1, Lisbon-1, Portugal]

Aspects covered in this standard include: definition of the product; quality of the raw material (tendons, aponeuroses and fat not to exceed 50%); permitted curing brine constituents; required organoleptic properties; packaging; and labelling. AJDW

## 46

[Prepared dishes. Sterilized 'guven' stew.]

Bulgaria, D'rzhaven Komitet za Standartizatsiya *Bulgarian Standard* BDS 5427-77, 8pp. (1977)

[Bg]

This standard, which supersedes BDS 5427-72, applies to 'guven', a stew made from mixed vegetables in sunflower seed oil, and sterilized in the can. Specific requirements include: sauce content (%), ≤ 30; DM (refractometry at 20°C) (%), 8-10; salt (%), 0.8-1.5; oil (%), 8-10; and Cu, Sn and Pb (mg/kg), ≤ 10, ≤ 100 and ≤ 0.3, resp. There is no tolerance for pathogenic, aerobic or non-sporeforming organisms, moulds or yeasts. The standard also covers packaging, sampling, testing, storage (shelf life, 18 months) and transport. HBR

## 47

[Fatty acid composition of the fat content of meat by-products in vegetable oil.]

Vlasenko, V. I.; Starchevoi, A. N.; Zhuravleva, K. Ya.; Mitsyk, V. E.

*Tovarovedenie* 10, 49-52 (1977) [16 ref. Ru]

Bovine brain, spinal cord and tongue were separately canned in sunflower seed oil alone and in a 1:1 mixture of sunflower seed oil and corn oil before sterilization for 20/65/20 min at 112°C.



After storage for 3 months, the contents of 18 fatty acids were determined by GLC with flame ionization detection. With both types of oil, essential polyunsaturated fatty acids (linoleic, linolenic, arachidonic) comprised 50-60% of the total fatty acids, while the content of  $C_8$ - $C_{12}$  acids was < 1%. The combination of a meat product and vegetable oil is recommended for production of items of high nutritive value. KME

## 48

[Calculation of sterilization effects in canned meat products.] Zur Berechnung des Sterilisationseffektes von Konserven. Sielaff, H.; Schleusener, H.

*Fleisch* 32 (3) 55-56 (1978) [9 ref. De] [Sektion Nahrungsgüterwirtschaft & Lebensmitteltech., Humboldt-Univ., Berlin (GDR)]

After consideration of possibilities of measurement of temp. within sealed cans during sterilization in various types of autoclaves, methods are described for calculation of the lethality value, the F-value and the rate of destruction of microorganisms, on the basis of temp. changes. IN

## 49

[Possibilities and perspectives for improvement of the keeping quality of meat products and sausages.] Möglichkeiten und Perspektiven der Haltbarkeitsverlängerung von Fleisch- und Wurstwaren. Ahrens, G.

*Fleisch* 32 (3) 56-57 (1978) [De] [VEB Halberstädter Fleisch- & Wurstwarenwerke, German Democratic Republic]

Studies on prolongation of the storage life of canned meat and sausage products are described; aims were achievement of min. storage periods of 24 months under ambient conditions, and 60 months at  $\leq 10^\circ\text{C}$ . Technological aspects (e.g. use of automated autoclaves), microbiological aspects, physical aspects (e.g. storage temp., can corrosion) and chemical or enzymic aspects (e.g. oxidation processes in fat-rich products) are discussed in relation to their effects on shelf-life. Results for lacquered tinplate or Al cans showed that acceptable cold-storage periods were  $\leq 42$  months; and that, with the exception of fat or pork rind-rich products, shelf-life under ambient conditions may be  $\leq 36$  months. Studies are in progress on improvement of the shelf-life of semi-preserved Brühwurst sausages to 6 months. IN

## 50

[Reactivity of sodium nitrite in porcine adipose tissue after sterilization.]

Cattaneo, P.; Cantoni, C.; Cipolla, M.

*Industria Alimentari* 17 (5) 400-402 (1978) [29 ref. It, en] [Istituto di Ispezione degli Alimenti di Origine Animale, Fac. di Med. Vet., Univ. di Milano, Milan, Italy]

Pork adipose tissue was homogenized, and filled into cans, which were sterilized at  $112^\circ\text{C}$  for 55

min. The samples contained  $\text{NaNO}_2$  at concn. of 0 (control), 50, 100 or 150 p.p.m. Contents of free  $\text{NO}_2^-$ , bound  $\text{NO}_2^-$  and  $\text{NO}_3^-$  in the fat and in the connective tissue (CT) were determined by the method of Olsman & van Leeuwen [see FSTA (1978) 10 IS10]. Concn. found at the 50, 100 and 150 p.p.m. levels of  $\text{NaNO}_2$  addition were (ranges found): free  $\text{NO}_2^-$ , 8.2-24% in fat and 49-50% in CT; bound  $\text{NO}_2^-$ , 2-2.1% in fat and 5-7% in CT; and  $\text{NO}_3^-$  formed 6-10% in fat and 7-19% in CT; none was found in the control. The results are considered to confirm the formation of a bond between the nitrites and pork fat and CT. HBr

## 51

Effect of prior refrigeration on botulinal outgrowth in perishable canned cured meat when temperature abused.

Tompkin, R. B.; Christiansen, L. N.; Shaparis, A. B.

*Applied and Environmental Microbiology* 35 (5) 863-866 (1978) [9 ref. En] [Swift & Co., Res. & Development Cent., Oak Brook, Illinois 60521, USA]

Perishable canned cured meat inoculated with *Clostridium botulinum* spores was placed at  $4.4^\circ$  or  $10^\circ\text{C}$  after manufacture. Spore germination occurred at  $10^\circ\text{C}$ . The germinated cell count remained stable over a period of 16-18 wk. During that time period the inhibitory system and residual nitrite decreased. These factors combine to make perishable canned cured meats more prone to spoilage and potential hazard if they are temp. abused after a period of refrigerated storage. AS

## 52

Causes of variation in botulinal inhibition in perishable canned cured meat.

Tompkin, R. B.; Christiansen, L. N.; Shaparis, A. B.

*Applied and Environmental Microbiology* 35 (5) 886-889 (1978) [6 ref. En] [Swift & Co., Res. & Development Cent., Oak Brook, Illinois 60521, USA]

Final internal processing temp. within the range  $63$ - $74^\circ\text{C}$  did not alter the degree of botulinal inhibition in inoculated perishable canned comminuted cured pork subjected to abusive storage at  $27^\circ\text{C}$ . Adding haemoglobin to the formulation reduced residual nitrite after processing and decreased botulinal inhibition. Different meats yielded different rates of botulinal outgrowth when substituted for fresh pork ham. Pork or beef heart meat showed no inhibition of the *Clostridium botulinum* inoculum even with a  $156\text{-}\mu\text{m/g}$  amount of  $\text{NaNO}_2$  added to the product. This effect appears to be one of stimulating outgrowth, since residual nitrite depletion was not measurably altered. AS

## 53

[Meat preserves. Chicken in jelly. Specification.] Union of Soviet Socialist Republics, Gosudarstvennyi Komitet Standartov



**Soviet Standard GOST 608-77, 3pp. (1977) [Ru]**

This standard, which supersedes GOST 608-56, applies to canned chicken in jellied broth. Specific requirements include: meat content,  $\geq 60\%$ ; jelly content,  $\leq 40\%$ ; m.p. of jelly,  $\geq 18^\circ\text{C}$ ; salt content, 1.0-1.4%; and Sn salts content,  $\leq 200\text{ mg/kg}$ . There is no tolerance for Pb or foreign admixtures. The canned product has a shelf life of 2 yr from date of production. KME

## 54

**[Meat preserves. Chicken ragout in jelly.**

**Technological requirements.]**

Union of Soviet Socialist Republics,

Gosudarstvennyi Komitet Standartov

**Soviet Standard GOST 7991-77, 3pp. (1977)**

**[Ru]**

This standard, which supersedes GOST 7991-56, applies to canned, sterilized chicken ragout in jelly. Specific requirements include: m.p. of jelly,  $\geq 18^\circ\text{C}$ ; salt content, 1.0-1.4%; Sn salts,  $\leq 200\text{ mg/kg}$ ; and Pb salts, no tolerance. Max. shelf life is 2 yr. KME

## 55

**[Meat preserves. 'Tourist lunch'. Technological requirements.]**

Union of Soviet Socialist Republics,

Gosudarstvennyi Komitet Standartov

**Soviet Standard GOST 9936-76, 5pp. (1976)**

**[Ru]**

This standard, which supersedes GOST 9936-62 and 5.38-67, applies to canned brined pork, beef and lamb (with spices). Specific requirements include: meat content, 88.3 or 93.2% (depending on type); sodium nitrite,  $\leq 3\%$ ; salt, 1-2%; and Sn salts,  $\leq 200$  or (with 'State Quality' label)  $\leq 100\text{ mg/kg}$ . There is no tolerance for foreign substances or Pb salts. The standard also covers packaging (can sizes) and storage (shelf life  $\leq 3\text{ yr}$ ). KME

## 56

**[Meat preserves. Pork sausage meat. Technological requirements.]**

Union of Soviet Socialist Republics,

Gosudarstvennyi Komitet Standartov

**Soviet Standard GOST 12186-77, 5pp. (1977)**

**[Ru]**

This standard, which supersedes GOST 12186-66 and GOST 5.826-71, applies to canned, sterilized pork sausage meat. Specific requirements include: moisture content,  $\leq 70\text{ wt.}\%$ ; starch,  $\leq 5\%$ ; salt, 1.6-2.0%; sodium nitrite,  $\leq 3\text{ mg/100 g}$ ; Sn salts,  $\leq 200\text{ mg/kg}$ ; and Pb salts, no tolerance. Max. shelf life is 2 or 3 yr, depending on quality grading. KME





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FAB 51

MEAT CANNING

SELECTED FROM VOLUME 11

FOOD SCIENCE AND TECHNOLOGY ABSTRACTS

under the direction of

Commonwealth Agricultural Bureaux, Farnham Royal, Bucks; Gesellschaft für Information und Dokumentation, Frankfurt am Main; Institute of Food Technologists, Chicago; Centrum voor Landbouwpublikaties en Landbouwdocumentatie (Pudoc), Wageningen.



## INTRODUCTION

Food Annotated Bibliographies (FABs) are collections of abstracts on specific topics in food science and technology. The topics are chosen by the staff of the International Food Information Service as being of particular interest or importance. The topics normally interest individual workers, who may not require the full information provided in Food Science and Technology Abstracts, from which the abstracts for FABs are taken. The size and the cost of the FABs are controlled as much as possible with the interests of individual workers in mind.

Titles of the FABs now available are given on the back cover of this booklet. For up-to-date lists of FABs or suggestions for new topics please write to the address on the back cover. New subjects are searched for at least the five most recent volumes of Food Science and Technology Abstracts. Thereafter each FAB is updated monthly. Copies of each month's abstracts on any topic may be obtained as indicated on the back cover of this publication. At the end of each volume of up-dating, the abstracts are merged and made available as a separate supplement to the original FAB.

Some of the larger FABs have been divided into sections to facilitate use. FAB 47 also has a subject and author index provided.

Copies of all original articles referred to in the abstracts may be bought (or occasionally borrowed) from the International Food Information Service. A form for ordering these is provided at the end of this FAB.

Coverage of the subject has been restricted to that of Food Science and Technology Abstracts, which covers over 1200 of the important food journals, patents from 20 countries and books published world-wide. Every effort is made to include all significant references, but editorial discretion is used on the many articles of borderline interest. If the reader particularly needs an exhaustive search of the subject, we will be pleased to provide any other references that we have available. We would, in any case, encourage readers to write or telephone us with any comments or queries that they may have.

H. BROOKES

EDITOR





## 1

[Study on heat resistant putrefactive spore formers in Korean soil and processed foods. I. Survey on regional distribution of spore forming bacteria.]

Koo, Y.-J.; Shin, D.-H.; Kim, C.-O.; Min, B.-Y.

*Korean Journal of Food Science and Technology* 10 (2) 224-230 (1978) [23 ref. Ko, en] [Food Res. Inst., Agric. & Fishery Development Corp., Seoul, S. Korea]

Heat resistant putrefactive microorganisms causing spoilage of canned and processed foods were examined in the compost on a mushroom growing bed, casing soil, raw mushrooms and canned products before sterilization at canneries. The total count and spore formers were monitored from the sample taken. 9 strains of the most highly heat resistant spore formers among the 140 spore formers isolated were selected and D and Z values determined by the Thermal Death Time method. The most heat resistant strain was No. F-10, a facultative thermophile, which was isolated from raw mushroom. Its Z value was 21.1° F (m/15 phosphate buffer solution) and D<sup>250</sup> was 6.6 min. AS

## 2

Fate of *Clostridium botulinum* in perishable canned cured meat at abuse temperature.

Christiansen, L. N.; Tompkin, R. B.; Shaparis, A. B. *Journal of Food Protection* 41 (5) 354-355 (1978) [2 ref. En] [Swift & Co., Res. & Development Cent., 1919 Swift Drive, Oak Brook, Illinois 60521, USA]

Perishable canned cured pork was prepared as follows: (i) with 156 µg NaNO<sub>2</sub>/g and inoculated with 100 C. botulinum spores/g; (ii) 156 µg NaNO<sub>2</sub>/g, 10<sup>4</sup> spores/g; or (iii) 50 µg NaNO<sub>2</sub>/g, 100 spores/g. Cans were stored at 27° C and those of normal appearance were sampled at intervals. Contents of residual NaNO<sub>2</sub>, spores/g and spores + vegetative cells/g are tabulated for (i)-(iii). Competition occurred between rate of nitrite depletion and rate of death of germinated cells. Residual NaNO<sub>2</sub> declined to <6 µg/g in 28 days for (i) and (ii) and 12 days for (iii). Spore counts were <1/g in (i) after canning and declined as cells germinated; geometric mean of 5 counts at 43 days was 0.047 spores/g, 14.3 spores + vegetative cells/g (2 of 5 cans had >10<sup>3</sup> spores + cells/g). In (ii) spore counts decreased rapidly after canning from 4600/g at day 1 to 38/g after 10 days and 3.2/g after 28 days. Botulinal outgrowth occurred at <20 µg NaNO<sub>2</sub>/g (after 10 days); after 10 days 4 of 5 cans had <1000 cells/g and 1 had >100 000 cells/g, after 43 days 3 of 5 cans had <1000 cells/g and 1 had <100 000 cells/g. In (iii) botulinal outgrowth occurred at 13-26 µg NaNO<sub>2</sub>/g (after 5 days) after geometric mean total viable botulinal count had decreased to 30/g. DIH

## 3

Influence of short term tumbling, salt and phosphate on cured canned pork.

Ockerman, H. W.; Plimpton, R. F., Jr.; Cahill, V. R.; Parrett, N. A.

*Journal of Food Science* 43 (3) 878-881 (1978) [18 ref. En] [Dep. of Anim. Sci., Ohio State Univ., Columbus, Ohio 43210, USA]

Tumbling for 30 min produced pork tissue which was soft and pliable with a creamy, tacky, exudate on the

surface. After canning and cooking the tumbled cured product was more cohesive, slightly lighter in colour and yielded a slightly reduced shear score. An increase in cohesiveness values was found for products treated with salt and tripolyphosphate and a significant interaction was also observed. Tumbling for 30 min was not sufficiently long to increase yield, texture or sensory characteristics. IFT

## 4

Ham, canned; cured.

United States of America, General Services Administration, Federal Supply Service

*Federal Specification PP-H-61E*, 23pp. (1977) [En] [Washington, DC 20406, USA]

This specification supersedes PP-H-61D (1973) and covers cured, canned, boneless, skinless, shankless whole ham held under refrigeration at -1° to 4° C for ≤9 months. It covers requirements for the ham, processing and finished product, examination of product and packaging, and preparation for delivery. AL

## 5

Beef, corned, canned

United States of America, General Services Administration, Federal Supply Service

*Federal Specification PP-B-201G*, 19pp. (1977) [En] [Washington, DC 20406, USA]

This specification supersedes PP-B-201F (1971) and covers standard (commercial product) and special corned beef. It covers requirements for raw material and finished products, testing of product and cans, defects, packaging, etc. AL

## 6

[Canned meat. Pork with beans.]

Romania, Institutul Roman de Standardizare *Romanian Standard STAS 10 272-75*, 5pp. (1975) [Ro] [Strada Roma 32-34, Bucharest, Romania]

This standard covers the following aspects: raw material quality; organoleptic properties; microbiological quality; physicochemical properties; quality control and analytical techniques; packaging and labelling; storage and transport; and min. guarantee period. Physicochemical quality requirements include the following: meat + fat, ≥31%; fat, ≤10%; beans, ≥39%; acidity (as lactic acid), ≤0.5%; NaCl, 1.2-2.0%; Sn, ≤100 mg/kg; Pb, ≤1 mg/kg; Cu, ≤5 mg/kg. AJDW

## 7

[Heat resistance of *Clostridium sporogenes* 25 spores in canned 'beans with pork'.]

Liebert, T. L.; Kann, A. G.; Mandel, V. A.

*Tallinna Polütehnilise Instituudi Toimetised* No. 402, 43-48 (1976) [3 ref. Ru, en]

Survival of Cl. sporogenes 25 spores was studied after exposures in pH 7 buffer and in extracts from canned beans and pork to temp. of 115°, 118° or 121.1° C. The composition of the product was DM 35.6, protein 10.6, fat 11.3, salt 0.9 and ash 1.1%. On the basis of D and z values obtained, an F value of 4.2 was calculated, which can be used for defining the sterilization regime. SKK



8

[Temperature changes in can during sterilization.]  
Kann, A. G.; Liebert, T. L.; Suurtkhal, A. A.; Kask, K. A.  
*Tallinna Polütehnilise Instituudi Toimetised* No. 402  
49-54 (1976) [7 ref. Ru, en]

Autoclave temp. and temp. in the centre of a SKO 83-I can of 'beans with pork' during sterilization pattern at (25-60-40)/120 were measured every 5 min during a total of 125 min. It is calculated from the tabulated data that for  $z = 12^\circ \text{C}$ , the lethality coeff. L for the product was 11.5. SKK

9

Hungarian limited clearances for spices and onions extended; industrial interest increases.

Anon.

*Food Irradiation Information* No. 8, 63-67 (1978) [En, fr]

Following earlier clearance for experimental irradiation of spices with 500 krad, permission was granted for the irradiation of an additive containing spices and other dried ingredients for meat canning. Addition of 10% of a treated mixture of wheat flour, powdered garlic, sodium caseinate, powdered onions and ground paprika, significantly reduced the time required for canning luncheon meat and increased output. Clearance was granted for irradiation of 2000 kg fresh onions intended for test marketing and 30 000 kg fresh onions for processing into dried onion flakes. Both trials were successful: both fresh onions and onion flakes were of excellent quality. A prototype semi-mobile irradiator has been designed specifically for the treatment of onions. RM

10

Influence of tumbling, tumbling time, trim and sodium tripolyphosphate on quality and yield of cured hams.

Krause, R. J.; Ockerman, H. W.; Krol, B.; Moerman, P. C.; Plimpton, R. F., Jr.

*Journal of Food Science* 43 (3) 853-855 (1978) [10 ref. En] [Dep. of Anim. Sci., Ohio State Univ., Columbus, Ohio 43210, USA]

44 boncless, cured hams were assigned to treatment groups to study the effect of tumbling, tumbling time (18 h intermittent, 9.5 h intermittent, 3 h continuous), tumbling temp. ( $5^\circ$  and  $15^\circ \text{C}$ ), sodium tripolyphosphate (TPP) pickle level (0 and 3.3%), and trim (lean, regular, and fat) on the quality and yield of canned hams. Tumbling significantly improved ham external appearance, colour, sliceability, taste and aroma, and yield. 3-h continuous tumbling resulted in less improvement in product quality and yield than did the 18-h intermittent tumbling. Significant improvements in external appearance, colour, sliceability, taste and aroma, and yield resulted from TPP treatments. Hams trimmed to  $\leq 3 \text{ mm}$  fat cover before tumbling had significantly better sliceability and yield. IFT

11

Pasteurization and sterilization of meat products.  
[Lecture]

Jul, M.

*International Congress of Food Science &*

*Technology - Abstracts* p.36 (1978) [En] [Danish Meat Products Lab., Howitzvej 13, 2000 Copenhagen F, Denmark]

Aspects discussed include: plastics film-wrapped ready-to-serve and ready-to-eat refrigerated meat products; flavour defects in canned meats as a result of excessive heat treatment; retortable flexible packs; problems with proposed limitations on use of nitrites; and microbiological problems with vacuum-packaged sliced meat products made from meat cuts (e.g. hams) pasteurized in large cans. [See FSTA (1979) 11 2A60.] AJDW

12

[Visit of the RIA to the Dolo cannery at Bressuire.]  
Tiphaine, D.

*RTIA (Revue Technique et Economique de l'Industrie Alimentaire)* 25 (262) 53, 55, 57-58 (1978) [Fr]

The Dolo cannery is described with details of its production lines for corned beef, processed beef products, tripe, braised beef and carrots, and frozen steaks and roasts. RM

13

[Use of modified starches for improving the quality of prepared foods.] Einsatz von modifizierten Stärken zur Verbesserung der Qualität zubereiteter Nahrungsmittel  
Marschke, H.

*Industrielle Obst- und Gemüseverwertung* 63 (9) 231-238 (1978) [1 ref. De]

This review discusses the applications of modified starches in food processing in relation to processing technology (HTST sterilization), legal aspects (declaration, limits), structure and properties of native starch, properties and application of modified starches (e.g. production of prepared dishes in the cold), heat transfer during sterilization, and mechanical can-filling of lumpy foods. 3 possible applications of modified starches in can-filling are described, i.e. a low-amylose cold-swelling waxy maize starch (snowflake® 12410) for clear, non-cohesive meat and vegetable dishes; a cold-swelling heat-stable starch (snowflake® 12611) for cold gravy preparation and further addition of non-linked waxy maize starch-bound gravy (snowflake® 06301), or a stable swelling starch (snowflake® 12611) and a non-hydrolysed strongly cross-linked waxy maize starch with delayed swelling (snowflake® 06308) used together to produce a thick gravy for meat and vegetable dishes. RM

14

[Filling under vacuum.] Füllen unter Vakuum.  
Anon.

*Fleischerei* 29 (9) 52-53 (1978) [De]

Equipment for filling of meat products into cans under vacuum is described, with reference to design, construction and operation of the equipment, and advantages of the process. Vacuum filling is applicable to meat emulsions and to large pieces of meat (e.g. hams). AJDW



## 15

**The role of nitrite in the production of canned cured meat products.** [Review]

Lechowich, R. V.; Brown, W. L.; Deibel, R. H.; Somers, I. I.

*Food Technology* 32 (5) 45, 48, 50, 52, 56, 58 (1978) [52 ref. En] [Dep. of Food Sci. & Tech., Virginia Polytech. Inst., Blacksburg, Virginia 24061, USA]

This review is largely concerned with the role of nitrite and other factors in controlling *Clostridium botulinum* in canned cured meats. The following topics are discussed: the curing process; the bacteriological safety of canned cured meats; factors affecting this safety (the heating process, residual nitrite concn., NaCl concn., pH, storage temp. and the interrelationship of these factors); the incidence of *Cl. botulinum* in meat products; and *Cl. botulinum* spore germination, outgrowth and toxin production and their control in cured meats. JA

## 16

**[Practical aspects of seasoning. Basic principles, information and tips.]** Die Praxis des Würzens:

Grundlagen - Informationen - Tips.

Pfeiffer, W.

*Fleischerei* 29 (5) 74-76, 78 (1978) [De] [Wickenreuther Allee 26, D-8650 Kulmbach, Federal Republic of Germany]

Use of spices for seasoning of meat products is discussed, with reference to: quality characteristics of spices; microbial and mineral contamination of spices; constituents of spices; evaluation and comparison of batches of spices; packaging of spices; and use of spices in various types of sausages and in canned meat products. AJDW

## 17

**[Manufacture of canned blood sausage (black pudding).]** Zur Herstellung von Blutwurstkonserven.

Reichert, J. E.

*Fleischerei* 29 (5) 13-16, III, IV (1978) [12 ref. De, en, fr, ru] [Fachhochschule Lippe, Liebigstrasse 87, D-4920 Lemgo 1, Federal Republic of Germany]

Aspects discussed in this paper on manufacture of canned or bottled blood sausage include: coagulation of blood, and its prevention by intensive stirring or addition of stabilizers; use of nitrite or nitrate for stabilization of the colour; curing agents; reduction of the proportion of red corpuscles in the blood used (to avoid development of an excessively dark colour); and heat-sterilization conditions. A recipe is given for manufacture of 'intermediate' quality blood sausage. AJDW

## 18

**Factors affecting inhibition of *Clostridium botulinum* in cured meats.**

Lee, S. H.; Cassens, R. G.; Sugiyama, H.

*Journal of Food Science* 43 (5) 1371-1374 (1978) [21 ref. En] [Food Res. Inst., Univ. of Wisconsin, 1805 Linden Drive, Madison, Wisconsin 53706, USA]

Ground pork trim was formulated with various levels of nitrite and one of 2 NaCl concn., canned and heated

at 90°, 100° or 110° C. Cured meats were similarly prepared with meat whose sulphhydryls had been reacted with Ag<sup>+</sup>. Antibotulinum activity in these cured products was tested by inoculating *Clostridium botulinum* spores directly into canned meats (96 spores/150 g) or into meat/buffer homogenates (1:1, w/v) adjusted to 30 p.p.m. NaNO<sub>2</sub> (48 spores/16.5 ml). Antibotulinum activity was detected by both challenges. It was greater in meats cured with higher nitrite concn., was lower if processing was at high temp. (110° vs. 90° C) and decreased during storage of the cured meats. Inhibitory activity was found in cured products made of Ag<sup>+</sup>-treated meats. IFT

## 19

**Antibotulinal role of isoascorbate in cured meat.**

Tompkin, R. B.; Christiansen, L. N.; Shaparis, A. B.

*Journal of Food Science* 43 (5) 1368-1370 (1978) [22 ref. En] [Swift & Co., Res. & Dev. Cent., Oak Brook, Illinois 60521, USA]

The effect of antioxidants, reducing agents, and a chelating agent were tested in perishable canned cured meat. Isoascorbate, ascorbate, and cysteine enhance the antibotulinal effect of nitrite in perishable canned cured meat. It was determined that this effect was not due to the antioxidant or reducing properties which these compounds possess. The data indicate that they enhance the effect of nitrite by sequestering metal ion(s) in the meat. It is suggested that nitrite (nitric oxide) reacts with a cation-dependent material within the germinated botulinal cell and blocks a metabolic step which is essential for outgrowth. Enhancement of nitrite by isoascorbate, and similar compounds, may be due to preventing repair of damaged material or formation of new cation-dependent material. IFT

## 20

**Collagen content of some Australian canned meats.**

Board, P. W.; Montgomery, W. A.; Rutledge, P. J.

*Journal of the Science of Food and Agriculture* 29 (6) 569-573 (1978) [7 ref. En] [Div. of Food Res., CSIRO, North Ryde, Australia, 2113]

146 samples of canned meat products from 11 manufacturers were analysed for salt, moisture, fat, protein and collagen (7.14 × hydroxyproline) content. Results are tabulated for each product. Mean collagen contents found (%) ± s.d. (with mean collagen % of total protein in parentheses) were: corned beef 3.26 ± 0.87 (14.0); corned beef + cereal 2.16 ± 0.51 (12.5); ham 1.46 ± 0.59 (8.9); cured pork shoulder 1.45 ± 0.37 (9.1); and comminuted ham products 1.73 ± 0.39 (13.3). Results are discussed with respect to possible legislation on max. contents of collagen in meat products. DIH

## 21

**Estimation of drained weight in canned meat curry.**

Madhwaraj, M. S.; Nair, P. R.; Nair, K. K. S.; Kadkol, S. B.; Baliga, B. R.

*ISI Bulletin* 29 (8) 279-282 (1977) [5 ref. En] [Cent. Food Tech. Res. Inst., Mysore-570 013, India]

Drained wt. of meat chunks in a curry and of kheema (meat mince) in a kheema curry was estimated using sieves of different mesh sizes, and using a uniform



draining procedure. In the case of meat chunks, there was only a small difference between the drained wt. estimate and the proportion of cooked meat. In the case of kheema, the difference was much greater because of loss of meat fines during draining. The use of a 2.8 mm sieve, and 4 rinsings after transfer of drained solids to another vessel are recommended for estimation of the drained wt. of both meat chunks and kheema. CFTRI

## 22

**The role of nitrite in the production of canned-cured meat products.** [Lecture]

Lechowich, R. V.; Brown, W. L.; Deibel, R. H.; Somers, I. I.

*Proceedings of the Meat Industry Research*

*Conference* pp. 47-55 (1978) [25 ref. En] [Dep. of Food Sci. & Tech., Virginia Polytech. Inst. & State Univ., Blacksburg, Virginia, USA]

Aspects considered include: the need for nitrite for control of *Clostridium botulinum* in canned meat products; the heat treatment required for microbiological safety of cured meats (with reference to effects of nitrite and NaCl, initial bacterial counts, adverse effects of intensive heat treatment on the organoleptic properties, and energy costs); residual nitrite levels after processing; the importance of initial and residual nitrite concn. for microbiological stability of the product; and nitrosamines. [See FSTA (1979) 11 3G208.] AJDW

## 23

**Choosing the best conditions for heat sterilization of canned poultry meat in rotary autoclaves.**

Anon.

*Fleischwirtschaft* 58 (6) 960-961; 968-970 (1978) [7 ref. En, dc]

This report on laboratory and factory trials in the USSR to determine primal conditions for sterilizing canned poultry meat in rotary autoclaves suggests the following parameters: 15 rev/min, liquid content 20%, headspace 8%, sterilization temp. 125° C. The specific cooking time/kg material falls with increase in size of can, from 140 ± 3 min for No. 3 size (capacity 250 ml) to 120 ± 8 min for No. 8 (353 ml) and 110 ± 7 min for No. 12 (565 ml). Meat sterilized under these conditions was similar to cooked meat, without 'sterilized' flavour. Factory tests showed that rotary autoclaves shortened the sterilization time and improved product quality, compared with stationary autoclaves. RM

## 24

**[Determination of cooking values for canned meat under practical conditions.]** Ermittlung von Erhitzungswerten für Fleischkonserven in der Praxis. Stiebling, A.

*Fleischwirtschaft* 58 (8) 1305-1312; 1254 (1978) [20 ref. De, en] [Bundesanstalt für Fleischforschung, 8650 Kulmbach, Federal Republic of Germany]

This paper discusses the parameters for expressing heat inactivation of bacterial spores, i.e. D-(destruction), z-, L-(lethality) and F-value (heat effect), the detn. of the heat effect (sterilization time and temp.), classification of canned meats into semi-, 1- and fully-preserved

products and products destined for tropical countries, and their heat treatment. Temp. detn. and factors affecting the temp. curves in cans during sterilization are discussed in detail, e.g. container material, size and shape, headspace, stationary or rotation autoclaving. Besides determining and fixing sterilization data it is necessary to check the temp. and pressure in the autoclave regularly. Detailed advice is given on test methods. RM

## 25

**[Current problems of canned meat sterilization.]** [Review]

Wojciechowski, J.

*Gospodarka Miesna* 30 (2) 24-26 (1978) [17 ref. Pl]

This review deals mainly with the findings of the author and his colleagues on differences in max. temp. achieved in different parts of an industrial autoclave [see FSTA (1976), 8 4S649], tabular data for (i) pork in its own juice, (ii) beef in its own juice, and (iii) 'English goulash' being extensively quoted; and with the publication of Wojciechowski & Harabasz [FSTA (1976) 8 8S1414]. The following F values are quoted from unpublished work of the author and collaborators: 'Touristic' canned meat 3.0, (i) 4.0, (ii) 4.0, and (iii) 3.0. SKK

## 26

**Occurrence of *Staphylococcus aureus* in and the moisture content of precooked canned bacon.**

Powers, E. M.; Latt, T. G.; Johnson, D. R.; Rowley, D. B. *Journal of Food Protection* 41 (9) 708-711 (1978) [13 ref. En] [Food Sci. Lab., U.S. Army Res. & Development Command, Natick, Massachusetts 01760, USA]

*Staph. aureus* was found in 9.0% of 221 cans of precooked bacon. The count in 6.9% of the cans exceeded 1000/g and ranged as high as  $1.7 \times 10^5$ /g. Aerobic plate counts were  $> 10^5$ /g in 24% of the cans. The max. moisture: salt ratio (% moisture divided by % salt) of 9.0 (permitted by Federal Specifications) was exceeded in 73.0% of the cans and ranged from 5.97 to 21.44. This bacon production was rejected for military procurement. AS

## 27

**The use of irradiated ingredients in food processing.** (In 'Food preservation by irradiation' [see FSTA (1979) 11 4G311]) [Lecture]

Kiss, I.; Zachariev, G.; Farkas, J.; Szabad, J.; Toth-Pesti, K.

I, 263-274 (1978) [22 ref. En] [Cent. Food Res. Inst., Budapest, Hungary]

The microbe-count reducing effects of  $\gamma$ -radiation and of ethylene oxide were compared in ground paprika and dried onion flakes. It was established that commercially applied ethylene oxide gas treatment has the same bactericidal effect (2-3 log cycles reduction of the total viable bacterial count) as a 5 kGy radiation dose [1 gray (Gy) = absorbed radiation energy of 1 J/kg material]. However, ethylene oxide treatment of paprika was practically ineffective in relation to mould count, while irradiation with 5 kGy destroyed moulds very effectively. The colour and pigment content of paprika powder were not diminished by this radiation



dose. A dry mixture intended for use in canned luncheon meat was treated with 5 kGy. The canned meat product produced with the radiation-decontaminated ingredients was microbiologically stable even when heat-sterilized by a sterilization equivalent of  $F_0 = 1.1$ . Considering the organoleptic features and microbiological safety, a heat treatment of about  $F_0 = 3$  is suggested when using irradiated ingredients. This is about the half of the  $F_0$  value generally proposed for completely stable canned meat products. Besides the saving of energy, a good quality can be achieved by using radiation-decontaminated ingredients. AS

## 28

**A study on the utilization of ducks into some processed products.**

Madlansacay, P. L.; Rivera, L. S.; Aducayen, T. R.; Contreras, E. S.

*Philippine Journal of Nutrition* 30 (2) 59-65 (1977) [6 ref. En]

Mallard and Muscovy ducks were employed to assess the dressing values for duck, and to determine their suitability for replacing chicken in some recipes.

Muscovy ducks dressed out at 69%, and commercial and University-raised mallards at 57% and 50%, resp.

Whole cured carcasses showed no significant differences in flavour and acceptability, but mallard had a different colour to Muscovy duck, perhaps due to greater cured-colour development in the former.

Addition of phosphate (0.5%) improved yield, and improved quality for  $\leq 1$  wk of frozen storage. Duck incorporated into 2 canned recipes (adobo and estofado) produced highly acceptable products. JRR

## 29

**[Nitrites, ascorbic acid and the bacterial flora in canned meat.] [Lecture]**

Cantoni, C.; Cipolla, M.; D'Aubert, S.

*Rivista della Società Italiana di Scienza dell'Alimentazione* 7 (2) 175-176 (1978) [It] [Istituto di Ispezione degli Alimenti di Origine Anim., Fac. di Med. Vet., Univ. degli Studi di Milano, Milan, Italy]

Samples of canned meat were prepared with or without 1000 mg sodium ascorbate/kg, and with 0, 5, 15, 25, 35, 45 or 55 mg  $\text{NaNO}_2$ /kg. After sterilization and storage (conditions and duration not specified), the  $\text{NO}_2^-$ ,  $\text{NO}_3^-$ , NO and ascorbate concn. and the incidence of bacterial contamination were studied. Tables of results are given. The results show that: considerable decomposition of  $\text{NO}_2^-$  occurs during sterilization; added ascorbate reduces the extent of  $\text{NO}_2^-$  decomposition; the max. residual  $\text{NO}_2^-$  concn. was 10.0 mg/kg;  $\leq 20.5$  mg  $\text{NO}_3^-$ /kg was formed, together with traces of NO; and concn. of ascorbate decreased during storage. Samples prepared with  $> 10$  mg  $\text{NaNO}_2$ /kg were sterile; those with lower  $\text{NaNO}_2$  levels were contaminated with anaerobic bacteria, 10% of samples with 5 or 10 mg  $\text{NaNO}_2$ /kg and 60% of samples without  $\text{NaNO}_2$  being contaminated. [See FSTA (1979) 11 4G310.] AJDW

## 30

**[Residues of chlorinated hydrocarbon pesticides in porcine tissues and in pasteurized canned pork.]**

Raseta, J.; Spiric, A.; Visacki, V.

*Tehnologija Mesa* 19 (1) 2-4 (1978) [11 ref. Sh, en] [Vet. Fak., Belgrade, Yugoslavia]

A large number of samples of fat and muscle tissue, liver, kidneys and pasteurized canned pork products was analysed. There was a high incidence of contamination with DDT and gamasan. As chlorinated hydrocarbon pesticides are fat-soluble the highest concn. were found in the fat. Gas chromatography was used for the analyses, with detector temp. of 200° C, injector temp. of 210° C, column temp. of 165° C, flow through velocity 80 ml/min, and 4 ml of sample. The samples were taken directly from the slaughtering line. STI

## 31

**[Effect of new packaging materials and forms on the retention of heat-labile food constituents during heat sterilization. I. Vitamin B<sub>1</sub> in prepared dishes containing meat.]**

Der Einfluss neuartiger Verpackungsmaterialien und -formen auf die Erhaltung thermolabiler Lebensmittelinhaltsstoffe bei der Hitzesterilisation. I. Vitamin B<sub>1</sub> in fleischhaltigen Fertiggerichten.

Bielig, H. J.; List, D.; Kruschel, A.

*Lebensmittel-Wissenschaft und -Technologie* 11 (4) 227-232 (1978) [8 ref. De, en] [Inst. für Lebensmitteltech., Tech. Univ. Berlin, Königin-Luise-Strasse 22, 1000 Berlin 33]

Three meat dishes (pork goulash, collared beef and Königsberge meatballs) were heat-sterilized in 2 different types of 2-kg containers, viz. tin cans and deep Al composite trays. Details are given of product factors affecting heat transfer, effect of containers dimensions on specific surface, thermotechnical characteristics in relation to structure, temp. conditions during sterilization, thiamin contents of the uncooked products and the losses during sterilization in relation to  $F_0$  values, and finally the results of organoleptic tests. The trays were found to possess clear advantages. The shape and large specific surface allowed better transfer of heat to the contents than was allowed by the greater heat-capacity of the can materials, and for similar  $F_0$  values the autoclaving time was reduced by 35%. While vitamin B<sub>1</sub> losses during sterilization in cans were 62% for goulash and 30% for the other 2 dishes, and 45 and 30% resp., for sterilization in trays. No marked differences in organoleptic qualities were noted. MJD

## 32

**[Biological value of new infant foods stabilized with different types of starch.]**

Petrovskii, K. S.; Khovaeva, L. A.; Terekhin, S. P.; Gonotskii, V. A.; Korotaeva, M. M.

*Voprosy Pitaniya* No. 1, 49-52 (1979) [8 ref. Ru, en] [I Moskovskii Meditsinskii Inst. im. I. M. Sechenova, Moscow, USSR]



Homogenized canned chicken baby foods (Kroskha brand) were made with 3 different var. of starch stabilizer (maize, amylopectin or potato), each in the native and modified (phosphate) forms (2% by wt.). Animal feeding tests indicated that the modified starches were nutritionally inferior to the native forms, whose nutritive value was potato > amylopectin > maize. HBr

### 33

[The effect of storage on the quality of canned meat products.]

Sorman, L.; Dubravicky, J.; Navarro, A.

*Zbornik Prac Chemickotechnologickej Fakulty SVST* pp. 251-259 (1973-1974, publ. 1978) [10 ref. Sk, ru, de]

Studies were conducted on liver paste packaged in non-lacquered tinplate cans, and beef in gravy packaged in lacquered cans. Changes in Sn, Pb, H<sub>2</sub>S, ammonium N contents and the flavour of the can contents during storage were determined, together with changes in the condition of inner surfaces of the cans. The results show that heavy metal concn. in the can contents increased during storage of the canned products for 3 yr, but did not exceed permitted levels. Heavy metal concn. were lower in food in lacquered than in that in non-lacquered cans. STI

### 34

The effect of iron on botulinal inhibition in perishable canned cured meat.

Tompkin, R. B.; Christiansen, L. N.; Shaparis, A. B. *Journal of Food Technology* 13 (6) 521-527 (1978) [14 ref. En] [Swift & Co., Res. & Development Cent., Oak Brook, Illinois 60521, USA]

*Clostridium botulinum* outgrowth in perishable canned cured meat products was investigated as a function of Fe content. Products were formulated from pork ham, beef round, beef liver or beef hearts, having natural Fe contents of 9-12, 20-27, 49 and 38-53 µg Fe/g, resp. Some pork ham and beef round samples were supplemented with FeCl<sub>2</sub> or FeCl<sub>3</sub> to give Fe contents of 86-113 µg/g. All products contained 156 µg NaNO<sub>2</sub>/g and 100 spores/g of a mixed inoculum of *C. botulinum* types A and B. Data presented graphically show rate of can swelling at 27° C. Beef heart products, and pork and beef round products with added Fe, showed loss of NaNO<sub>2</sub> inhibition of botulinal growth. Addition of Ca or riboflavin with the Fe did not affect this response. Beef liver samples showed similar inhibition to botulinal growth as beef round samples, despite having similar Fe content to beef heart. It is suggested that high levels of available Fe negate nitrite inhibition of botulinal growth. DIH

### 35

Effect of sorbic acid and sodium nitrite on *Clostridium botulinum* outgrowth and toxin production in canned comminuted pork.

Ivey, F. J.; Robach, M. C.

*Journal of Food Science* 43 (6) 1782-1785 (1978) [6 ref. En] [Monsanto Co., 800 N. Lindbergh Boulevard, St. Louis, Missouri 63166, USA]

Experiments to determine the effect of sorbic acid

alone and in combination with low nitrite and phosphate on botulinal toxin production in inoculated perishable, canned, comminuted, cured pork were conducted. 48 test lots of product were inoculated with approx. 100 spores/g of a mixture of 10 strains each of type A and B *Clostridium botulinum*. 25 cans of each test lot were incubated at 27° C for ≤ 110 days. The time of swelling was recorded for each can and the first 10 swells/test lot were tested for toxin. Multiple regression analysis of the time to first swell showed nitrite concn. had a significant linear effect on delaying outgrowth and toxin production of *C. botulinum*. Sorbic acid concn. was also significantly related to inhibition but through the 4th power of sorbic acid concn. The use of either sodium acid pyrophosphate or sodium hexametaphosphate was synergistic with sorbic acid as indicated by their statistically significant positive interactions. Several test lots containing 0.2% sorbic acid and either phosphate had no toxic swells after 110 days of incubation with or without 50 p.p.m. NaNO<sub>2</sub>. These data indicate that sorbic acid may be a potential alternative preservative to high levels of nitrite in canned, comminuted pork products. IFT

### 36

[Technology of manufacture of canned meat products over the last 50 years.] Die Technologie der Konservenherstellung in den letzten 50 Jahren. Winter, F. F.

*Fleischerei* 29 (10) 48, 50, 52; (11) 42, 44; (12) 68, 71 (1978) [De]

Developments in canned meat product manufacture over the period 1928 to date are briefly discussed; recipes for canned ham, various sausages, smoked beef, beef, lamb or pork in natural juices, veal, veal goulash, lamb with vegetables, roast meats, corned beef, lard substitute, liver sausage, and luncheon meat are given. AJDW

### 37

[Examination of canned meat products in quality control of stored products.] Die Untersuchung von Fleischkonserven bei der Überwachung von Lagerbeständen.

Kendereski, S.

*Fleischerei* 29 (12) 30, 32, 34-36, V-VI (1978) [15 ref. De, en, fr, es] [Inst. for Microbiol., Tech. Fac. Belgrade, YU-11 000 Belgrade, Yugoslavia]

Examination of canned meat products is discussed, with reference to: exterior examination of the can; analysis and olfactory evaluation of the gas released from cans on opening; bacteriological examination of the can contents; internal examination of the container; detn. of the wt., identity, composition and sensory properties of the can contents; testing the can seams; and incubation studies on non-opened cans. Recommendations for minimization of the risk of spoilage of canned meat products are given. AJDW

### 38

[Theory and practice in the manufacture of canned sausage products.] Theorie und Praxis bei der Herstellung von Wurstkonserven. Frey, W.



**Fleischerei** 29 (11) 13-15, 70 (1978) [De] [Raps & Co., Am Goldenen Feld 6, D-8650 Kulmbach, Federal Republic of Germany]

Manufacture of canned sausages is discussed with reference to: thermal sterilization (production of '3/4-preserved' vs. fully sterilized products); calculation of the required heat treatment (F-, z- and D-values); effects of the  $a_w$  and pH of the product on the potential for microbial growth; optimization of the quality of canned liver sausage, and Brühwurst-type sausages; and minimization of oxidative deterioration of the canned products. AJDW

## 39

[Production of canned meat.] Herstellung von Fleischkonserven.  
Kendereski, S.

**Schlachten und Vermarkten** 78 (2) 40-44 (1978) [4 ref. De, en, fr] [Inst. für Biochem. Tech., Univ. Beograd, Karnedzijevo 4, 11 000 Belgrade, Yugoslavia]

This review distinguishes 3 heat treatments of canned foods, i.e. pasteurization, boiling and sterilization, ( $< 100^\circ$ , at  $100^\circ$  and  $> 100^\circ\text{C}$ ), 3 types of canned product (semi-preserved, sterile and commercially-sterile) and discusses the importance of the sanitary condition of raw material, processing rooms, spices and waters, can quality and closure, heat resistance of bacteria (including effects of pH and of water activity), and heat transmission in cans (including effects of contents, can size and sterilization temp.). Roto-sterilization (at  $> 30$ , optimum 40-50 rev/min) allowed reduction of the sterilization time by 35-75%, with resulting energy savings and improved product quality. RM

## 40

[Prepared dishes. Chicken fricassee with cultivated mushrooms.]

Bulgaria, D'rzhaven Komitet za Standartizatsiya  
**Bulgarian Standard** BDS 14380-77, 5pp. (1977) [Bg]

The prepared dish, produced form, shall contain 5-8% fat, 18-22% DM, 0.8-1.5% salt, and max. 10, 100 and 0.3 mg/kg Cu, Sn and Pb, resp.; there is no tolerance for pathogenic, anaerobic or non-sporeforming organisms or moulds. Shelf life is 2 yr at  $\leq 15^\circ\text{C}$ . HBr

## 41

[Manufacture of canned meat and vegetable in inadequate conditions.]

Bukonja, S.; Tadic, Z.

**Hrana i Ishrana** 19 (7/8) 409-415 (1978) [17 ref. Sh, en] [Intendantski Inst. JNA, Belgrade, Yugoslavia]

Potential for manufacture of canned foods (meat + vegetable products in cans of capacity  $\leq 900$  g) without use of autoclaves is discussed, with reference to preservation by boiling at  $93-95^\circ\text{C}$ , Tyndallization (sterilization by stages), or boiling in NaCl solution at  $103-106^\circ\text{C}$ . Chemical composition of the processed products was determined, together with bacteriological quality (total aerobic and anaerobic counts, spore counts, and counts of gas-forming bacteria) before and after storage for 3 or 7 days at  $37 \pm 1^\circ\text{C}$ . Results show that canned products with a shelf-life of several months can be produced without use of autoclaves. IN

## 42

[The effects of modern curing methods on processed pork.] Betrachtungen über die Auswirkungen moderner Pökelmethode auf verarbeitetes Schweinefleisch.  
Rahelic, S.; Vicevic, Z.

**Fleischwirtschaft** 58 (10) 1612, 1614, 1616, 1618, 1620; 1654 (1978) [4 ref. De, en] [Inst. for Meat, Milk, Oils & Fats, Fruits & Vegetables, Fac. for Tech., Univ., Novi Sad, Yugoslavia]

In modern curing methods as generally used in the manufacture of canned hams, the curing brine is injected into the meat by multi-stitch machines. Meat treated in this way is then further worked mechanically by tumbling and rotating. Effects of these 2 processes on curing and the changes which lead to an improvement in product quality were examined. It was found that it is more effective for injection of the curing brine to precede mechanical treatment. When the mechanical treatment period is extended to  $\leq 16$  h, the meat becomes more and more tender and its water binding capacity increases. If the mechanical treatment period is further extended canned hams become tougher again and the juice released into the cans increases. Changes in meat properties associated with changes in muscle structure which could be detected by histological examination are shown in photographs. AS

## 43

Effect of sodium nitrite on the stability of pasteurized canned meat.

Wojton, B.; Kossakowska, A.; Ryglewicz, Z.; Moczybroda, J.

**Bulletin of the Veterinary Institute in Pulawy** 22 (1/2) 38-41 (1978) [19 ref. En] [Dep. of Hygiene of Anim. Products, Vet. Res. Inst., Pulawy, Poland]

Studies on the storage stability of pasteurized canned comminuted pork containing 2.5% NaCl and (i) 0, (ii) 50, (iii) 100 or (iv) 200 p.p.m.  $\text{NaNO}_2$  are described. The cans (capacity 340 g meat) were pasteurized at  $69^\circ\text{C}$  for 10 min, cooled, and held at  $37^\circ\text{C}$  until all cans were spoiled. The results show that all cans of 30-can batches of (i), (ii), (iii) and (iv) meat were spoiled after 8, 14, 22 and 28 days resp. Variance analysis by the F test showed the spoilage process to be linearly related to time, the slope differing between nitrite concn. Spoiled pasteurized canned meat samples contained *Clostridium perfringens*, *Cl. sporogenes*, *Cl. bifermentans*, enterococci and aerobic sporeforming bacilli. AJDW

## 44

Slicer/dicer and twin-piston pump improve product quality and efficiency.

Haney, G. B.; Stinson, W. S.

**Food Processing** 39 (12) 118-119 (1978) [En]

A slicer designed to handle boxed beef straight from the freezer, and a twin-piston food pump are described. The slicer handles blocks of up to 10 in  $\times$  24 in section of any length, cutting  $\frac{3}{4}$  in slices by a spiral slicing action which eliminates shredding and tearing. The pump handles a blended gravy/beef cube mix, continuously feeding the canning lines. Pressures of 15-330 lb/in<sup>2</sup> are produced without shearing or other damage to food particles  $\leq 4$  inches in diam. JRR



## 45

**Modern heat preservation of canned meat and meat products.** (In 'Food quality and nutrition' [see FSTA (1979) 11 8G639].) [Lecture]

Wirth, F.

pp. 219-238 (1978) [En] [Fed. Meat Res. Inst., Inst. of Tech., Kulmbach, Federal Republic of Germany]

This review-type paper discusses: bacteriological aims of meat canning processes (to destroy spoilage and food poisoning organisms); types of canned meat, classified according to intensity of heat treatment and storage stability (semi-, three-quarter-, fully- and tropical-preserved); problems associated with heat penetration of meat; the heating process (consideration being given to rotation sterilization, the HTST method, optimal temp. ranges during sterilization, and evacuation of air from cans); canned meat production methods, including fully-preserved products (goulash, frankfurters) and three-quarter-preserved products (liver sausage); importance of redox potential and raw material quality; and nutritive value of canned meat.

JA

## 46

**[Effect of inserting Al anode into cans holding pasteurized ham to inhibit corrosion of the tinplate.]** Ilic, K.; Stevanovic, M.; Djuric, Z.; Kralj, T.; Podboj, M. *Tehnologija Mesa* 19 (11) 320-323 (1978) [6 ref. Sh, en]

[Jugoslovenski Inst. za Tehnologiju Mesa, Belgrade, Yugoslavia]

In long-term tests designed to inhibit internal corrosion on epoxy-phenol-coated tinplate cans containing pasteurized ham, it was established that insertion of an Al electrode  $2.52 \times 3.03 \times 0.37$  mm effectively inhibited corrosion. The electrode should be welded onto the can bottom. STI

## 47

**[Effect of citric acid in canned pork goulash on internal sulphide corrosion of tinplate.]** Djordjevic, G.; Ilic, K.; Cvetkovic, M.; Bikicki, D.; Djonlija, D.

*Tehnologija Mesa* 19 (10) 294-297 (1978) [6 ref. Sh, en] [Jugoslovenski Inst. za Tehnologiju Mesa, Belgrade, Yugoslavia]

Effect of presence of citric acid in canned sterilized pork goulash on marbling and corrosion of the inside of the can was studied. Tincoated sheet steel and tinplate with an epoxy-phenol lacquer (with and without Al pigment) were tested. Identical tests were made on pork goulash without citric acid (control). After 1 month storage at room temp. and at 37°C the non-varnished tinplate became distinctly marbled, with black spots over the surface. Somewhat less intensive marbling and spotting occurred in the lacquered cans; the tinplate with Al-pigment lacquer exhibited marbling, but no black spots. Results of the tests are tabulated. STI

## 48

**Iron and the antibotulinal efficacy of nitrite.**

Tompkin, R. B.; Christiansen, L. N.; Shaparis, A. B.

*Applied and Environmental Microbiology* 37 (2) 351-353 (1979) [8 ref. En] [Swift & Co., Res. & Development

Cent., Oak Brook, Illinois 60521, USA]

Combinations of nitrite, isoascorbate, and ethylenediaminetetraacetic acid were compared for their antibotulinal efficacy in perishable canned cured meat. A dose response relationship of available Fe to the antibotulinal efficacy of nitrite was demonstrated. AS

## 49

**[The present stage of development in the manufacture of canned meats.]** Entwicklungsstand bei der Herstellung von Fleischkonserven.

Wirth, F.

*Fleischwirtschaft* 59 (4) 475-476, 478-482, 484-486; 536-541 (1979) [De, en] [Bundesanstalt für Fleischforschung, 8650 Kulmbach, Federal Republic of Germany]

This review includes sections on: the effect of heat on canned meats (distinction of 4 groups, based on heat treatment and resultant shelf-life); heat penetration into canned meats (effect of liquid contents on heat transfer); newer heating methods (rotation sterilization, HTST methods, optimum temp. range for different kinds of product, use of vacuum); factors influencing quality (container shape, raw materials, Eh); modern product developments (canned sausages, ready meals in large containers, roast meats in sauce); fully-preserved products; and future prospects. RM

## 50

**[Changes in DDT during processing of eggs and poultry meat.]**

Peretolchin, N. V.; Shumkova, I. A.; Karnaukhov, V. V. *Trudy, Vsesoyuznyi Nauchno-issledovatel'skii Institut Myasnoi Promyshlennosti* 20, 70-75 (1976) [6 ref. Ru]

The nature of breakdown products of DDT formed during processing of eggs and poultry meat contaminated by pesticides was studied. Chicken meat sterilized in cans at 20-35-20-120°C sequence and freeze-dried eggs dehydrated at 35-50°C were used in the experiments. Chromatography was used to identify compounds formed during heat processing of meat. Changes occurring during heat processing differed and were probably catalysed by various groups of compounds. DDT breakdown in chicken meat was due to reducing agents e.g. the Fe complex. During freeze-drying of eggs and heat processing of eggs DDT changes were due to dechlorination accompanied by enzyme action. STI

## 51

**[Quality of meat products in cans made from tinplate vacuum coated with Al.]**

Tychinin, A. I.; Solovykh, V. G.; Oreshkin, E. F.;

Barmash, A. I.; Marchenko, A. P.; Klimova, N. I.

*Myasnaya Industriya SSSR* No. 11, 33-37 (1978)

[10 ref. Ru] [Tsentral'nyi Nauchno-issled. Inst. Chernoi Metallurgii im. I. P. Bardina, USSR]

The technology of vacuum-Al coating was elaborated and experience gained with continuous production of Al coated tin-plate. The process is described. The metal sheet obtained is corrosion resistant and use of this



material does not require special equipment. The protective properties were laboratory tested. A combination of No. 3 and No. 9 cans were manufactured from the Al coated sheet. Meat products in the above cans were studied throughout 1 yr at 15–20°C. The results confirmed the possibility of using vacuum Al coated metal sheet for producing cans for meat products. STI

## 52

**A method for measuring the texture of meat and the effect of nitrite and salt addition on the texture of cured meats.**

Randall, C. J.; Voisey, P. W.

*Journal of Texture Studies* 8 (1) 49–60 (1977) [18 ref. En] [Food Res. Inst., Agric. Canada, Ottawa, Ontario K1A 0C6, Canada]

An instrumental technique was developed for measuring the texture of canned chopped ham using the 15 cm<sup>2</sup> wire extrusion cell of the Ottawa Texture Measuring System. Its measurement efficacy was evaluated by testing enzymically tenderized ham. This showed that the technique was sensitive to textural changes and that the level of the added enzyme affected the ham's texture exponentially. Nitrite addition to the canned chopped ham product at levels of 0–1000 p.p.m. did not affect its texture. The level of salt used in the curing solution, however, had a marked tenderizing effect. Similarly, compression tests on wieners indicated that nitrite addition did not influence their texture. It was concluded that the characteristic texture of the 2 products tested cannot be attributed to nitrite addition and that other factors such as the level of salt addition to the canned chopped ham must be responsible. AS

## 53

**[Use of cryogenics in the manufacture of special canned meat products.]**

Orlovskii, V. M.; Aleksandrova, N. A.

*Myasnaya Industriya SSSR* No. 12, 17–19 (1978) [3 ref. Ru] [Vses. Nauchno-issled. Inst. Kholodil'noi Promyshlennosti, USSR]

In order to establish the possibility of applying cryo-comminution to the manufacture of special meat products for baby food, test batches of canned products made from blanched beef were manufactured, and also batches made from non-blanched beef subjected to cryo-comminution. Two types of product were produced: a homogenized product and a puree. Sensory properties, the microstructure and chemical indicators of both groups of products were compared. The sensory properties of both groups were good, with good flavour, pink colour and uniform consistency. Chemical analysis showed that products from non-blanched cryo-minced beef compared well with products prepared from blanched beef. The results confirmed the possibility of using meat refrigerated by means of liquid N for the manufacture of special baby food products. Spectral reflection was used to evaluate colour of the product. STI

## 54

**['Maret' brand canned ham.]**

Anon.

*Alimentaria* No. 100, 117–118 (1979) [Es]

Data are given for the sensory properties, chemical composition, microbiological quality, labelling, compliance with standards, etc. of canned ham of this brand. Chemical composition (fresh wt. basis) was: moisture 61.10 g%; DM 38.90 g%; ash 2.90 g%; protein 18.50 g%; fat 17.50 g%; sugars 0.60 g%; polysaccharides 0; hydroxyproline 0.35 g%; NaCl 1.70 g%; nitrites 10 p.p.m.; nitrates 245 p.p.m.; P<sub>2</sub>O<sub>5</sub> 5600 p.p.m.; ascorbic acid 60 p.p.m.; sorbic acid 0; benzoic acid 0; moisture/protein ratio 3.30; artificial colorants 0; pH was 7.00. 1 g samples were negative for total aerobic or anaerobic bacteria, moulds, *Clostridium perfringens* and inhibitory substances. AJDW

## 55

**[Changes in the contents of organochlorine pesticide residues in canned chicken meat in relation to sterilization conditions and degree of comminution.]**

Zhukova, L. A.; Peretolchin, V. V.; Shumkova, I. A.

*Trudy, Vsesoyuznyi Nauchno-issledovatel'skii Institut Myasnoi Promyshlennosti* 20, 76–80 (1976) [8 ref. Ru]

Canned chicken in natural juice and canned minced chicken meat were used in the experiments. The meat:fat ratio in all samples was 9:1; the sterilization was carried out in a stationary autoclave with 20–35–20–120°C sequence and 0.15–0.18 mN/m<sup>2</sup> pressure or in a rotary autoclave at 5–35–15–125°C or 7–20–10–130°C and 0.15–0.18 mN/m<sup>2</sup> pressure. GC was used for qualitative detn. of pesticides and column chromatography on silica gel ASK with hexane-benzene (1:1) as elution agent for quantitative detn. Organochlorine pesticides were more readily broken down in cans containing the more finely comminuted product. Pesticides in canned chicken in natural juice were more completely decomposed when the rotary autoclave was used, but sterilization conditions did not affect the pesticide changes in finely comminuted meat. STI

## 56

**[New kinds of canned-meat infant and dietetic foods.]**

Gorbatov, V. M.; Ustinova, A. V.; Ivanova, M. A.;

Korobkina, G. S.; Levyant, P. P.

*Voprosy Pitaniya* No. 1, 53–59 (1979) [9 ref. Ru, en] [Inst. Pitaniya AMN SSSR, Moscow, USSR]

On the basis of an extensive review of literature data on the nutritive quality of various meats and organs, elaboration of recipes for 'Malysh' (based on beef), 'Malyshok' (based on veal), 'Yazychok' (based on beef tongue), 'Gerkules', 'Bezzubka' and 'Cheburashka' (all 3 based on liver, the last 2 also on resp. brains and tvorog) and 'Malyutka' (based among others on veal and brains) homogenized, pureed or comminuted infant and/or dietetic foods are described in general terms; no recipes are quoted. These foods have been approved for infant and invalid feeding after suitable tests in paediatric and medical establishments. SKK



## 57

**[Determination of content of metals in canned poultry meat products.]**

Martynyuk, T. G.; Sevostyanova, N. I.

*Trudy, Vsesoyuznyi Nauchno-issledovatel'skii Institut Myasnoi Promyshlennosti* 20, 40-45 (1976) [4 ref. Ru]

Methods for detn. of Pb, Cu and Sn recommended by COMECON were compared with standard Soviet methods (GOST) and other commonly used methods. Comparisons between 'wet' and thermal incineration of can contents showed that in practice the results for Cu and Pb were not influenced by the incineration method. For Sn the thermal method gave lower results. The sensitivity of methods recommended by the COMECON for detn. of Cu and Pb (0.2 mg/kg) was considerably better than that of the standard methods (5 and 10 mg/kg); for Sn the sensitivity of both methods was equal. The combination of 'wet' incineration and spectrophotometric detn. of metals permitted quicker analysis (by 5 to 6 h) in comparison with the standard methods. STI

## 58

**Isoascorbate level and botulinal inhibition in perishable canned cured meat.**

Tompkin, R. B.; Christiansen, L. N.; Shaparis, A. B.

*Journal of Food Science* 44 (4) 1147-1149 (1979) [16 ref. En] [Swift & Co., 1919 Swift Drive, Oak Brook, Illinois 60521, USA]

Isoascorbate can either enhance or decrease botulinal inhibition in inoculated perishable canned cured meat abused at 27°C. It enhances inhibition when the product is abused at the time of manufacture. It decreases inhibition if it is used in excessive levels or when the product is refrigerated before abuse. The 1st effect is due to the sequestering property of isoascorbate. The 2nd is because isoascorbate hastens the depletion rate of residual nitrite. The relative levels of residual nitrite and viable botulinal cells at time of abuse determine the degree of botulinal inhibition. Excessive levels of isoascorbate over those normally used (e.g., 200 µg/g) should be avoided in this class of product. IFT

## 59

**[Microbiological determination of vitamin B<sub>12</sub> in heat-treated foods.]**

Hozova, B.; Sorman, L.

*Prumysl Potravin* 29 (9) 496, 529-530 (1978) [12 ref. Sk] [Chemickotech. Fak., Slovenska Vysoka Skola Tech., Bratislava, Czechoslovakia]

Pigs' liver was (i) cut into cubes and braised with a small amount of fat and water and 1% NaCl for 15 min, (ii) sliced and fried with 1% salt in a little fat for 5-10 min, or (iii) minced, filled into 0.5-kg cans and sterilized for 70 min at 121°C. Samples of pig longissimus dorsi muscle (LM) were (iv) prepared and braised as (i) for 30 min, or (v) fried as (ii) for 3 min, or (vi) salted, sliced and sterilized as (iii). Samples of beef LM were (vii) braised as (i) for 30 min, or (viii) fried as (ii) for 10 min, or (ix) sterilized as (vi). All tests were in triplicate on semi-industrial scale. Vitamin B<sub>12</sub> contents were determined by the *Lactobacillus leichmanii* method. Mean values, with s.d., were (µg/100 g): pigs'

liver, raw  $2.06 \pm 0.089$ , (i)  $0.831 \pm 0.037$ , (ii)  $0.532 \pm 0.051$ , and (iii)  $0.442 \pm 0.006$ ; pork, raw  $0.124 \pm 0.001$ , (iv)  $0.076 \pm 0.006$ , (v)  $0.066 \pm 0.007$ , and (vi)  $0.041 \pm 0.006$ ; and beef, raw  $0.197 \pm 0.008$ , (vii)  $0.087 \pm 0.011$ , (viii)  $0.067 \pm 0.007$ , and (ix)  $0.057 \pm 0.002$ . SKK

## 60

**[Identification of horse meat in canned comminuted meat products.]**

Renon, R.; Cantoni, G.; Calcinardi, C.

*Archivio Veterinario Italiano* 29 (5/6) 159-160 (1978) [6 ref. It, en] [Istituto di Ispezione degli Alimenti di Origine Anim., Univ. degli Studi di Milano, Milan, Italy]

A procedure for detn. of the presence of horse meat in canned meat products on the basis of the fatty acid composition (determined by GLC) is described, with reference to experimental data for the fatty acid composition of (i) pork/beef/horsemeat sausages and (ii) pork/beef sausages. Total saturated/unsaturated fatty acid ratio and various other fatty acid ratios were calculated, and are presented. (i) and (ii) samples could be differentiated on the basis of their total saturated/unsaturated fatty acid ratio (0.674 vs. 0.537), the C14 + C16 + C18/C18:2 ratio (4.421 vs. 2.495), the (C18:3/C18:1) × 100 value (3.007 vs. 2.664) or the C14:0/C16:0 ratio (6.151 vs. 7.018). AJDW

## 61

**Development of concentrated meat gravies. (In 'Proceedings of the First Indian Convention of Food Scientists and Technologists' [see FSTA (1979) 11 12A871]) [Lecture]**

Kadkol, S. B.; Madhwaraj, M. S.; Ravindranathan Nair, P.; Nair, K. K. S.; Baliga, B. R.

p. 88, No. 8.7 (1979) [En] [Cent. Food Tech. Res. Inst., Mysore, India]

Procedures involved in preparation of various types of conc. gravy (e.g. mutton Kashmiri, mutton Mogalai, mutton Niligiri Kurma) included: cleaning and preparation of materials and deboning of meat and cutting into chunks; cooking and drying of ingredients; mincing and mixing of ingredients; finishing; formulation correction; preheating to 80-85°C; filling into cans, sealing and processing; and labelling. Heat penetration studies indicated that processing at 10 lb/in<sup>2</sup> (gauge) for 60 min was adequate for 301 × 309 size cans. The gravies obtained were of a thick free-flowing consistency, contained 35-40% TS and could be stored without spoilage for up to 1 yr. Curry was prepared by mixing equal quantities of mutton Kashmiri gravy and meat chunks and cooking at 15 lb/in<sup>2</sup> (gauge) for 25-30 min. The curry obtained was similar in sensory properties to conventional and canned curries. JA

## 62

**[Meat and meat and vegetable preserves. Packaging and marking.]**

Union of Soviet Socialist Republics, Gosudarstvennyi Komitet Standartov

*Soviet Standard GOST 13534-78*, 7pp. (1978) [Ru]

This standard, superseding GOST 13534-68, covers packaging and marking requirements for meats and meat and vegetable mixtures in cans with lacquered or non-lacquered inner or outer surfaces or in glass jars. Wt. tolerance shall be ≤ 1 kg, ± 3%; ≥ 1 kg, ± 2%. KME

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FAB 51

MEAT CANNING

SELECTED FROM VOLUME 12  
FOOD SCIENCE AND TECHNOLOGY ABSTRACTS

**under the direction of**

Commonwealth Agricultural Bureaux, Farnham Royal, Bucks; Gesellschaft für Information und Dokumentation, Frankfurt am Main; Institute of Food Technologists, Chicago; Centrum voor Landbouwpublikaties en Landbouwdocumentatie (Pudoc), Wageningen.





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H. J. BROOKES

EDITOR





## 1

**The detection and determination of pork in canned meat and sausages.**

El-Sayed, L.; El-Dashlouty, A.

*Rivista Italiana delle Sostanze Grasse* 56 (2) 52-58 (1979) [41 ref. En, it] [Cairo Univ., Cairo, Egypt]

The proportion of pork in canned beef and pork meat products was determined via the ratio saturated (S):unsaturated (U) fatty acids at position 2 in triglycerides. The fat from meat products with varying proportions of lean and fat pork was extracted, and the 2-monoglycerides prepared by the pancreatic lipase method and separated by silica gel-AgNO<sub>3</sub> TLC. The % of pork was related to the palmitic acid enrichment; palmitic acid enrichment factors, unsaturation ratios, saturation:unsaturation ratios at 2-monoglycerides and USU:SUS ratios are proposed for products with  $\geq 5$ , 10 or 20% pork. RM

## 2

**Detection of pig's fat in some imported canned meat products.**

Dabash, A. S.; Gebriel, A. Y. El-Dashlouty, A. A.

*Research Bulletin, Faculty of Agriculture, Ain Shams University* No. 1044, 15pp. (1979) [9 ref. En, ar] [Food Sci. Dep., Fac. of Agric. Ain Shams Univ., Cairo, Egypt]

6 samples of imported canned beef products were tested for adulteration with pork fat by a procedure involving GLC analysis of triglycerides and 2-monoglycerides prepared therefrom, and detn. of the palmitic acid enrichment factor, unsaturation ratio, and mol. ratio of C16 to C18 fatty acid in the 2-monoglycerides [see preceding abstr.] and evaluation of the glyceride pattern by the method of van der Wal [Journal of the American Oil Chemists Society (1960) 37, 18]. Tables of results are given. The results show 2 of the 6 samples to contain lard. AJDW

## 3

**Studies of the effect of heat processing on various spoilage values of meat and fish. II. Cured meat.**

Pearson, D.; Koozehkonani, M.; Lee, K. L.

*Journal of the Association of Public Analysts* 14 (4) 133-138 (1976) [8 ref. En] [Nat. Coll. of Food Tech., Univ. of Reading, Weybridge, Surrey, UK]

Beef was examined principally for total volatile N (TVN) and the free fatty acids (FFA) of the extracted fat after wet curing, dry curing and canning. Previous work involving correlations with organoleptic data indicated that the critical acceptable value for freshness of raw beef was of the order of 80 mg TVN/100 g of meat protein. Wet curing of beef resulted in a fall in the TVN of 20% and dry curing in a fall of 13% due to leaching of meat juices into the curing medium. The TVN figure therefore still gives some indication of the condition of non-heated cured meats. As the TVN after canning is about 2.7 x the value for raw meat, it cannot be employed for assessing the acceptability of heat processed products. The FFA rises only slightly during curing and heat processing, and all laboratory-prepared meats and all acceptable commercial products gave figures <2.0% FFA when calculated as oleic acid on the extracted fat. AS

## 4

**Hermetically sealed metal containers for food and drinks. II. Food cans for meat and products containing meat for human consumption.**

International Organization for Standardization

*International Standard ISO 3004/II-1979*, 3pp. (1979) [En]

This standard specifies a recommended range of capacities, with related diam. where applicable, for round and non-round food cans for meat and products containing meat. [See also preceding abstr.] AL

## 5

**[Economic data on batch packaging of preserves and lard.]**

Navratil, J.

*Zpravodaj Masneho Prumyslu* No. 3/4, 27-31 (1978)

[Cs, ru, en] [Vyzkumny Ustav Masneho Prumyslu, Brno, Czechoslovakia]

For several yr, the products listed in the title have been multiple-packaged by overwrapping in shrinkable polyethylene film, using a BSF-1 machine made in Blanicke strojirny n.p., Vlasim, Czechoslovakia. An economic analysis is given of packaging of meat products (in 415 g cans), liver pate (in 190 g cans) and lard (in PVC containers sealed with Al foil) as shrink-film wrapped multipacks or in cartons. The results show shrink-film wrapping to be more economic. An approx. economic evaluation is also given of multi-packaging of liver pate (in 80 g cans) in shrink-film or in cartons. STI

## 6

**[Effects of additives and autolytic changes in meat on selected indices of nutritional value of canned meats.]**

Janitz, W.

*Roczniki Akademii Rolniczej w Poznaniu Rozprawy Naukowe* No. 84, 41pp. (1978) [86 ref. Pl, en, ru]

A 3 x 8 factorial experiment was conducted to determine effects of autolysis in meat and of different curing schemes/additive contents on nutritional quality of canned meat. Pork loin eye muscle was used either fresh, after storage at 4°C for 7 days, or after thawing for 12 h at 15°C after frozen storage. Additive variables tested were combinations of curing salts, liquid smoke, potato starch and fat. Results presented graphically show effects of each of the 24 treatments on amino- and non protein-N, soluble collagen, in vitro protein digestibility, essential amino acids, total and free tryptophan, nutritional value calculated from amino acid content, available lysine, methionine and cysteine, and thiamin contents. Variations between samples were in general due to effects of meat autolysis rather than additives, especially on in vitro digestibility, although changes were not always consistent. Canned meats produced with fat + starch had the highest nutritional value, those with liquid smoke had the lowest. Methionine and cysteine were the limiting amino acids in all treatments. [From En summ. and graphs.] DIH

## 7

**[Role of substitutes for meat proteins in meat product quality.]**



Uchman, W.

*Roczniki Akademii Rolniczej w Poznaniu Rozprawy Naukowe* No. 80, 55pp. (1977) [many ref. Pl, en, ru]

Effects of substituting non-meat proteins for meat in products such as canned meat, sausages and frankfurters on product quality and processes used was studied. Substitutes used included caseinates, whey protein, dried skim milk, soy flours or concentrates, and blood preparations. Extensive tabulated data show effects of substitution on sensory acceptability (and individual sensory characteristics, colour, juiciness etc.), colour measurements, reflectance measurements, effects on physico-chemical properties of sausage emulsions, contents of volatile fatty acids and carbonyl compounds in sausages and emulsions, and effects on digestibility and nutritional value of products. In general, addition of meat substitutes decreased product quality, but in some cases modification of functional properties of substitutes (choice of different soy preparations, etc.) or alteration of process used, depending on individual meat product, could reduce adverse effects. [From En summ.] DIH

## 8

[Electron microscopic findings of the changes in the muscle under the influence of brine.]

Rahelic, S.; Milin, J.

*Fleischwirtschaft* 59 (7) 971-972; 977-979 (1979) [2 ref. En, De] [Fac. of Tech., Univ. of Novi Sad, Akademaska 2, Yugoslavia]

The effects of curing salts on muscle structure were studied by electron microscopy. Samples of raw and cured, tumbled, canned *M. biceps femoris* were examined by electron microscopy after standard and brine fixation, and changes in muscle fibre structure are shown in micrographs. Results confirmed the findings of light microscopy that z-membranes and actin myofilaments are broken down by the brine. RM

## 9

[Evaluation of the uniformity of heat treatment of all parts of a canned meat product. II. Effect of dimensions of cylindrical packs.] Bewertung der räumlichen Gleichmässigkeit der Erhitzung von Fleischkonserven. II. Einfluss der Ausmasse bei zylindrischen Verpackungen.

Wojciechowski, J.; Pezacki, W.

*Fleischwirtschaft* 58 (12) 1990, 1993-1995; 1975 (1978) [15 ref. De, en] [Agric. Acad., Wojska Polskiego 31, 60-624 Poznan, Poland]

The effects of can dimensions and vol. on the spacial dynamics of heating and the temp. equilibrium during sterilization of canned meat were investigated. The coeff. of can shape, evenness of heating and sterilization (time needed to heat each cm<sup>3</sup> of product of  $F_c \geq 4$  min) were calculated and analysed for luncheon meat in 12 can sizes (52, 73 and 99 x 28, 60, 90 and 110 mm, can area 88.2-495.8 cm<sup>2</sup>, can vol. 59.4-846.2 cm<sup>3</sup>, ratio height: diam. 0.28-2.11). Results, shown graphically and in a table, indicated that heating time can be calculated as a function of can height by a first degree equation (correlation coeff. of can height and sterilization time,  $r = 0.984-0.997$ ). As the can vol. increased with can

height, the time coeff. did not change significantly, though the evenness of cooking changed with changes in can height at the same diam. The results suggest that a suitable can shape and coeff. of even heating can be chosen for each product. The successful application of controlled sterilization depends on strict control of heating conditions. [See FSTA (1977) 9 4S679 for part I.] RM

## 10

Containers for poultry meat.

Taneja, B. S.; Winter, A. R.

*Poultry Guide* 16 (4) 33-39 (1979) [13 ref. En] [Punjab Agric. Univ., Ludhiana, Punjab, India]

Poultry meat stored in lacquered cans possesses better appearance than those stored in plain cans. Glass jars (which are cheaper and transparent) can also be used for packaging of poultry meat, provided the lids are air-tight. CFTRI

## 11

[Beef in its own juice. Quality requirements.]

Czechoslovakia, Urad pro Normalizaci a Mereni

*Czechoslovak Standard* CSN 57 7627, 2pp. (1978) [Cs]

This standard, which partially supersedes CSN 57 7601 (1964), applies to beef canned in its own juice, with aspic. The product shall contain  $\geq 58\%$  solids, including  $\leq 6\%$  tendons,  $\geq 74\%$  moisture,  $\geq 16\%$  fat and  $1.4 \pm 0.6\%$  NaCl. HBr

## 12

[Pork in its own juice. Quality requirements.]

Czechoslovakia, Urad pro Normalizaci a Mereni

*Czechoslovak Standard* CSN 57 7628, 2pp. (1978) [Cs]

This standard, which partially supersedes CSN 57 7601 (1964), applies to pork canned in its own juice, with aspic. The product shall contain  $\leq 58\%$  solids, including  $\geq 6\%$  tendons,  $\geq 60\%$  moisture,  $\geq 33\%$  fat and  $1.4 \pm 0.6\%$  NaCl. HBr

## 13

[Hermetically sealed food cans. Cylindrical can for meat products. Capacities of cans of 73 mm diameter.]

Yugoslavia, Savezni Zavod za Standardizaciju

*Yugoslavian Standard* JUS M.Z2.028, 1p. (1978) [Sh]

## 14

[Hermetically sealed food cans. Cylindrical cans for meat. Capacities of cans of 99 mm diameter.]

Yugoslavia, Savezni Zavod za Standardizaciju

*Yugoslavian Standard* JUS M.Z2.029 1p. (1978) [Sh]

## 15

[Potential application of analysis of phytates for determination of added soy protein extenders to meat products.]

Klocko, I.; Krajewski, K.; Rutkowski, A.

*Gospodarka Miesna* 31 (6) 22-26 (1979) [17 ref. Pl]



Corned beef was made with incorporation of 0, 2, 4, 6 and 8% soy protein isolate (Promine D), and resultant variations in protein, moisture, total P, phytate P and (i) Fe/phytate P ratio in ferric phytate in the canned products (autoclaving for 40 min at 120°C, storage at 4°C) were determined, (i) varied between 0.840 and 0.855 for the samples with added Promine D. The phytate analysis method is considered suitable for detn. of soy protein in meat products. HBr

## 16

[Heat-preserved foods. V. Determination and stabilization of thiamin in heat-preserved beef.] Hitzekonservierte Nahrungsmittel. V. Bestimmung und Stabilisierung von Thiamin in hitzekonserviertem Rindfleisch.

Riemschneider, R.; Kalin Ghouri, I. A.; Abedin, M. Z. *Alimenta* 18 (5) 147-150 (1979) [5 ref. De, en] Inst. für Biochem. der Freien Univ. Berlin, Postfach 1164, D-1000 Berlin 19]

The thiamin content of HTST-canned beef was determined by the thiochrome method. Results, shown graphically and in tables, revealed initial thiamin contents of 0.065 mg/100 g immediately after canning (0.06-0.09, mean 0.08 in raw meat), falling to and stabilizing at 0.035 after 40 days. Addition of stoichiometric amounts (related to residual O<sub>2</sub>) of ascorbic acid stabilized thiamin content at 0.041 mg/100 g after 40 days (twice stoichiometric amounts at 0.044 mg/100 g), though it fell to 0.035 after 93 days. Citric acid stabilized thiamin at 0.046 mg/100 g after 40 days, followed by a drop to 0.035 at 80 days. The relatively high constant total vitamin C level in HTST-canned potatoes (23.3 mg/100 g after 6 months) is attributed to the protective (antioxidant) action of ascorbic acid [See *Betriebsverpflegung* (1979) 7, 22 for part IV.]

## 17

**Evaluation of muscle quality of pig carcasses on the slaughter line.** [Lecture]

Jedlicka, J.; Mojto, J.; Palenik, S.

*Acta Agriculturae Scandinavica* Supplement 21, pp. 149-156 (1979) [16 ref. En] [Res. Inst. of Anim. Prod., Nitra, Czechoslovakia]

Studies were conducted to evaluate the feasibility of measurement of muscle pH of carcasses on the slaughter line, and to determine the extent to which muscle pH<sub>i</sub> measurements (30-60 min post mortem) are of value as an indicator of meat quality. pH<sub>i</sub> measurements were made on the *semimembranosus* muscle of 4002 carcasses, and the *longissimus dorsi* muscle of 2531 carcasses. Mean pH<sub>i</sub> was 6.11 ± 0.26 for the *semimembranosus*, and 6.07 ± 0.30 for the *l. dorsi*. Correlations between pH<sub>i</sub> values in the 2 muscles on individual days of the experiment ranged from  $r = 0.3894$  to  $r = 0.5598$ , and were highly statistically significant. Frequencies of individual pH<sub>i</sub> ranges in the *semimembranosus* muscle were: ≤ 5.8, 15.15%; 5.9-6.1, 39.93%; 6.2-6.5, 40.83%; and ≥ 6.6, 4.09%. Batches of canned ham were prepared using carcasses having *semimembranosus* muscle pH<sub>i</sub> of ≤ 5.8, or 6.2-6.5. Cooking losses of the hams did not differ significantly

between the 2 muscle pH groups, although the higher pH<sub>i</sub> group gave slightly lower % cooking loss. This result is discussed in relation to literature data. [See FSTA (1980) 12 4S532.] AJDW

## 18

**Thermal processing times and thermodynamic properties of canned meat rolls.**

Cohen, J. S.; Wierbicki, E.

*Transactions of the ASAE* 21 (6) 1242-1245 (1978) [15 ref. En] [Radiation Preservation of Food Div., US Army Natick Res. & Development Command, Natick Massachusetts, USA]

Thermal processing conditions for 4 different meat rolls (beef, pork, ham and chicken) were determined experimentally: heat processing times required to achieve  $F = 6.0$  at 240°F (115.6°C) retort temp. in 404 × 309 cans varied from 153 min for ham to 176 min for beef rolls. By using these values and other processing constants, the specific heat of the meat was calculated, using various values for the thermal conductivity. Best results were obtained by the 'preferred' equation of Sweat [See FSTA (1976) 8 2S183] to calculate thermal conductivity. The calculated temp. rise of the products ranged from 2.33 to 2.50°K/kJ absorbed. The process times were shown to be a function of the fat and/or moisture content and could be calculated from this information. RM

## 19

**[New infant feeding products from eggs and poultry meat.]**

Gonotskii, V. A.; Korotaeva, M. M.; Krainyaya, V. S.; Kholodov, V. V.; Popik, G. F.

*Myasnaya Industriya SSSR* No. 9, 22-24 (1979) [Ru] [NPO "Kompleks", USSR]

Process technology for making 3 types of canned baby food (up to 1 yr of age) is described in detail; the types differ in the degree of dispersion of meat fibre. The product is made in a continuous mechanized line. For babies over 10 months of age sheet TU 49 505-78 specifying canned chicken soup (puree), is given. The finished product contains (in %): fat, 5.95; proteins, 6.7; dry residue, 20.6. To extend the range of products for school age children technologies and formulae for 5 types of egg sausages are given. There is also potential utilization of by-products such as stomachs, hearts for child feeding. Data on making these foods, progress in manufacture and consumption, and possible extension of production are discussed. STI

## 20

**Prediction of water activity,  $a_w$ , in cook-soak equilibrated intermediate moisture meats.**

Webster, C. E. M.; Wood, R. M.; Ledward, D. A.

*Meat Science* 3 (1) 43-51 (1979) [17 ref. En] [Food Sci. Lab., Dep. of Applied Biochem. & Nutr., Univ. of Nottingham School of Agric., Sutton Bonington, Loughborough, Leics. LE12 5RD, UK]

Cubes of trimmed post rigor meat (approx. 1 cm<sup>3</sup>) were placed in cans containing 1.5 × the meat wt. of an infusing solution comprising 9.5% NaCl, 0.5% potassium sorbate, and amounts of humectant (glycerol,



propylene glycol or sorbitol) calculated to give  $a_w$  values of 0.62–0.95; the cans were then sealed and heated in a 77°C water bath for 15 min to an internal temp of 70°C. The  $a_w$  value of the processed products was determined using the Sina-equi-hygroscope, or calculated by the equation of Ross [*Food Technology* (1975) 29, 26] or a modification of the method of Grover [*Journal of the Society for Chemistry in Industry* (1947) 66, 201]. Tables and graphs of results are given. The modified Grover method gave appreciably better agreement with measured  $a_w$  values than the Ross method, under the conditions studied. For the systems studied, propylene glycol was the most, and sorbitol the least efficient humectant. AJDW

## 21

[Integrated processing of bones in Poland.] Krokha, Yu. A.; Boltenkov, I. M.; Faivishvskii, M. L. *Myasnaya Industriya SSSR* No. 10, 37–41 (1979) [Ru] [Ministerstvo Myasnoi i Molochnoi Promyshlennosti USSR, USSR]

Methods of processing of bones for food and technical applications in Poland are described, and data are given for the performance of equipment for removal of meat residues, boning of sub-standard poultry and use of the resulting meat in smoked products, canned products and meat pastes. An integrated process is described, which produces edible fat, meat/fat mass, edible stock and feed flour; yields of these products (% of raw bone wt.) are 6–8, 28–30, 8 and 32–38%, resp. Throughput of the equipment is 700 kg/h; it is operated by 8 workers. Economic aspects of bone processing are discussed. STI

## 22

Possibilities of the application of flavours in meat products.

Polic, M.; Trumic, Z.; Modic, P. *Tehnologija Mesa* 20 (2) 34–35 & 36–37 (1979) [8 ref. En, Sh] [Jugoslovenski Inst. za Tehnologiju Mesa, Belgrade, Yugoslavia]

Studies were conducted on the use of artificial flavourings in experimental batches of canned ground meat, liver pate and semi-dry sausages made with the min. permitted meat content and the max. permitted contents of pork rinds, fatty tissue and edible offal. The results show that acceptable products could be made with addition of 0.3 or 0.5% Pork B2 1032 flavouring, 0.5% Meat TA flavouring, or, in the case of liver pate, 0.5% Liver Intensifier 85802. Higher concn. of artificial flavours masked the flavour of the raw materials, spices, etc. to an undesirable extent. STI

## 23

[Meat and meat products. Determination of the volume occupied by the product.]

Central America, Instituto Centroamericano de Investigacion y Tecnologia Industrial *Central American Standard* ICAITI 34 125 Part 21, 2pp. (1977) [Es] [Avenida La Reforma 4-47, Guatemala City, Guatemala]

A procedure is specified for detn. of the vol. occupied by the contents of cans or jars of meat products. The

container is carefully opened, and the distance from the max. possible filling level to the actual level of the can contents is measured. The can is then emptied, washed, and filled with water (at 20°C) first to the max. filling level, then to the level formerly occupied by the contents; wt. of the can + water is determined in both cases. The % of container vol. occupied by the product may then be calculated on the basis of these data (equation given). AJDW

## 24

[Tryptophan and hydroxyproline contents as indicators of quality of ready-to-eat meals and canned meat products.]

Sokele, B.; Vuksan, B. *Tehnologija Mesa* 20 (2) 44–46 (1979) [10 ref. Sh, en] [Prehrambeno Tehnoloski Fak. Osijek, Yugoslavia]

Experimental samples of liver paste and canned ground meat products and also ready-to-eat meals (beef goulash, Baranja stew, leg muscles in sauce), all varying in the composition of raw materials used, were analysed quantitatively for tryptophan and hydroxyproline. The protein content of all the products examined did not differ much but it could be differentiated on the basis of tryptophan and hydroxyproline content. Muscle protein has an average content of 1.2% tryptophan whereas connective tissue contains none. Elastin contains 1.6–2.0% hydroxyproline and collagen contains 8.7–13.0% hydroxyproline. STI

## 25

[The composition of chicken or poultry fricassee.] Zusammensetzung von Hühner- bzw. Geflügelfricassee. Lange, H.-J.

*Fleischwirtschaft* 60 (1) 72–74; 103 (1980) [8 ref. De, en] [Gotlandwinkel 3, 2300 Kiel 1, Federal Republic of Germany]

43 samples of canned chicken or poultry fricassee from 5 manufacturers were analysed. Tabulated results showed meat contents of 22.8–41.8%, mean 34.2%, and only 5 samples with  $\geq 40.0\%$  meat (by preparative gravimetric detn. of total meat as % of total contents). A re-examination of the guidelines is suggested, as the specified 40% meat in the finished product does not correspond to general commercial practice. RM

## 26

[Microbiological classification of canned meats.]

Mikrobiologische Einteilung von Fleischkonserven. Leistner, L.

*Fleischwirtschaft* 59 (10) 1452, 1454–1455; 1504 (1979) [many ref. De, en] [Bundesanstalt für Fleischforschung, 8650 Kulmbach, Federal Republic of Germany]

The classification of canned meats according to heat treatment [see Leistner et al. *Fleischwirtschaft* (1970) 50, 216–217] is revised; 5 types of meat products are distinguished by their heat treatment, water activity ( $a_w$ ) and F-value: semi-preserved (canned ham, refrigerated ready-to-eat foods, fresh sausages);  $\frac{3}{4}$ -preserved (canned Brühwurst, liver sausage, blood sausage, brawn;  $F_c$  value 0.6–0.8); fully preserved (canned beef and pork in its own juice, corned beef, goulash, soups, ready-to-eat meals;  $F_c$  value 4.0–5.5); tropical canned foods ( $F_c$  value



12.0–15.0); and shelf stable products ( $a_w < 0.95$ ). The important contaminating bacteria for each type, heat treatment, storage conditions and shelf life are discussed. RM

## 27

[Comparison of technico-economic indexes for making cooked sausages and chopped meat preserves.]

Krasnov, S. E.; Razinkov, N. F.; Androsova, L. V. *Izvestiya Vysshikh Uchebnykh Zavedenii, Pishchevaya Tekhnologiya* No. 4, 21–23 (1979) [Ru] [Moskovskii Tekh. Inst. Myasnoi & Molochnoi promyshlennosti, Moscow, USSR]

It is suggested that manufacture of cooked meat products should be restricted in areas with poorly developed meat production and processing; these regions should be supplied with canned meat products from regions with well developed slaughter animal rearing and meat processing industries. The economics of manufacture of cooked sausages and canned chopped meat are compared. The canned product contains more connective tissue, as a result of differences in boning techniques; however, the heat treatment to which the connective tissue is subjected during canning prevents adverse effects on the nutritional and organoleptic quality of the product. STI

## 28

[Stability of preserves made from meat of pigs irradiated with different doses of ionizing radiation.]

Kossakowska, A.; Kossakowski, S.; Widsenska, T.; Wojton, B.

*Medycyna Weterynaryjna* 34 (12) 731–736 (1978) [24 ref. Pl, ru, en] [Zaklad Higieny Produktow Zwierzeczych, Inst. Weterynarii, Pulawy, Poland]

2 pigs from a group of 5 weighing 50 kg on average, and 2 from a group weighing 100 kg on average were irradiated from a  $^{60}\text{Co}$  source with 300 R at 150 R/h, exposure being in 4 body positions; 2 pigs from each group were similarly irradiated with 600 R; and 1 pig from each group served as control. The pigs irradiated at 300 R were slaughtered 7 and 14 days later; those irradiated at 600 R were slaughtered 7 and 12 days later; and control pigs were slaughtered 14 days later. The pigs irradiated at 600 R showed transient signs of radiation sickness directly after irradiation and progressive marked signs 9–11 days after irradiation. 24 h after slaughter, samples of meat of each pig were cut into  $3 \times 3 \times 3$  cm cubes, cured for 48 h in the proportion of 27 g NaCl and 0.1 g  $\text{NaNO}_2$  to 1000 g meat, minced, filled into 190-g cans, sealed, pasteurized to internal temp. of 67–68°C and stored at 37°C or 6°C for 6 months. A total of 347 cans was examined. At 37°C, all cans (23–28/variant) were blown within 4 wk. Detailed data are tabulated on contents of total bacteria, enterococci, coliforms and anaerobic sporeformers in cans before storage at 37°C; contents of aerobic and anaerobic sporeformers and cocci in the blown cans; contents of salt, moisture and nitrites and pH after 6 months storage; and on acid and peroxide values of fat in cans before storage and after storage for 3 and 6 months. The main conclusions were that meat of

pigs irradiated at 600 R and killed 12 days later showed the lowest stability; and that oxidative processes in fat were stimulated to a greater extent than hydrolytic processes in meat of heavily-irradiated pigs. SKK

## 29

[Quality control in a canned meat plant, at Papa, Hungary.]

Vakany, E.

*Konzerv-es Paprikaipar* No. 4, 140–143 (1979) [Hu, de, ru] [MEM-EHESZ Papai Kirendetsege, Papa, Hungary]

In 1978, the plant produced 4561 t of minced pork, 27.7 t beef tongue, 26.2 t pork tongue, and 168.3 t ham. Every phase of production is checked and rechecked regularly, both for quality and for hygiene. The examinations include meat inspection, incubation tests, evaluation of keeping quality, microbiological tests, wt. detn., organoleptic examination, and chemical analysis (including testing for the presence of pesticides, hormones and antibiotics.). ESK

## 30

[Quality control of pork in its own juice using a rendering method.] Untersuchungen zur Qualitätskontrolle von Schweinefleisch im eigenen Saft mit Hilfe des Ausschmelzverfahrens.

Hildebrandt, G.; Wiegner, J.; Schneider, W.; Thein, G. *Fleischwirtschaft* 60 (2) 207, 208, 210, 212, 214; 253 (1980) [8 ref. De, en] [Bundesanstalt für Veterinärmed. & Lebensmittelhygiene, Invalidenstrasse 60, 1000 Berlin 21]

The rendering method for detn. of fat content was standardized to allow its use for in-plant process control. Tests on 1770 cans of pork in its own juice showed that it combines adequate accuracy with savings in time, labour and material. Tabulated results showed deviations of 1.5–8.1% from chemical (Soxhlet) analysis, mean difference 2.7%, correlation coeff.  $r = +0.30$  to  $+0.40$  ( $P \leq 0.005$ ). Considerable variations were observed between batches in 2 factories, i.e. F-values (analysis of variance) 3.77 and 5.25 for different batches, 3.96 and 8.93 for daily production. For adequate control the mathematical evaluation should be complemented by graphical evaluation of frequency distribution. RM

## 31

[Effect of meat pH on biochemical characteristics of meat preserves.] [Lecture]

Oreshkin, E. F.; Bobrikova, E. G.; Alekhina, L. V.; Mikhailova, M. M.; Solodovnikova, G. I.

*Proceedings of the European Meeting of Meat Research Workers* No. 24, C3:1–C3:6 (1978) [6 ref. Ru, de, en, fr] [Vses. Nauchno-issled. Inst. Myasnoi Promyshlennosti, Moscow, USSR]

Pasteurized ham (heat-treated at 82°C) and stewed pork (heat-treated at 115°C) were produced in 250-g cans by customary procedures from fresh meat of pH 5.2–5.5, or 5.7–6.2, or  $> 6.3$ . pH was also determined before filling into cans and after heat treatment; and contents of protein, fat, salt, moisture, carbonyl compounds, lactic acid and volatile fatty acids, amino



acid composition of protein, and titratable acidity were determined in the preserves, which were also assessed organoleptically. It is concluded from tabulated and graphically presented results that titratable acidity and contents of lactic acid, carbonyl compounds and volatile fatty acids decreased with increase in fresh meat pH; that initial pH did not significantly influence the other constituents, or amino acid composition; that proportion of jelly increased with decrease in initial pH, and exceeded the tolerance limit in preserves made from meat of initial pH of 5.2–5.5; and that preserves made from such meat were of lower organoleptic score than those made from meat of the other 2 pH categories. It is recommended that pig meat with pH > 5.5 be used for the preservation procedures stated. [See FSTA (1980) 12 8S1280.] SKK

### 32

[Determination of thioethers in canned meat.] [Lecture]

Marchenko, A. P.

*Proceedings of the European Meeting of Meat Research Workers* No. 24, L3:1–L3:6 (1978) [11 ref. Ru, de, en, fr] [Vses. Nauchno-issled. Inst. Myasnoi Promyshlennosti, Moscow, USSR]

An apparatus for flash evaporation and vaporization from a continuous thin heated film under vacuum of volatile flavour compounds and their trapping in suitable absorbents [see FSTA (1973) 5 8S1031] is described and diagrammatically illustrated. Canned (i) 'stewed beef' and (ii) 'stewed mutton' in lacquered cans stored for 6 months at about 15°C were examined for thioether contents using a mercuric chloride trap and GLC analysis. Mean values with ranges for methyl sulphide contents of 5 samples of (i) and 5 samples of (ii) were resp. 2.3 (1.4–2.8) and 11.3 (7.0–14.2) µg/kg. Ethyl sulphide was not detected. [See FSTA (1980) 12 8S1280.] SKK

### 33

[Heat stability of Zebu cattle hump.] [Lecture]

Marinkov, B. M.; Basse, M.-T.; Seydi, M.

*Proceedings of the European Meeting of Meat Research Workers* No. 24, F7:1–F7:6 (1978) [4 ref. Fr, de, en, ru] [Inst. de Tech. Alimentaire, Dakar, Senegal]

Left half-carass parts of humps of 23 Senegal Zebu cattle taken after chilling at 3–5°C for 20 h after slaughter were cut into 2 × 2 × 2 cm cubes which were assigned visually to (i) lean, (ii) semi-fat and (iii) fat categories. Each category was then divided into 4 groups of about 3 kg each consisting of intact cubes, cubes ground through at 20-mm plate, cubes ground through a 10-mm plate, and cubes processed in a cutter at 20 rev/min. 120-g portions of each variant were vacuum sealed in 71.5 × 37.5 mm cans, heat-treated at 70°, 80°, 90°, 100°, 110° or 120°C for 30 min and separated juice and fat were determined. Data on moisture, fat, proteins, hydroxyproline and ash contents and fat characteristics of (i), (ii) and (iii) are tabulated; fat contents were 10.3, 29.9 and 52.1% of fresh wt. Overall losses of juice in (i), (ii) and (iii) were 32, 23 and 12%, and corresponding losses of fat were 1.9, 10 and 28% resp. Losses increased with increase in severity of

chopping and in temp., overall losses being 2.4 × greater at 120°C than at 70°C. [See FSTA (1980) 12 8S1280.] SKK

### 34

[Food value of meat by-products and vegetable proteins and prospects of their utilization in canned meat production.] [Lecture]

Oreshkin, E. F.; Bobrikova, E. G.; Khritinina, T. A.; Shirochenko, A. E.

*Proceedings of the European Meeting of Meat Research Workers* No. 24, H10:1–H10:6 (1978) [5 ref. Ru, de, en, fr] [Vses. Nauchno-issled. Inst. Myasnoi Promyshlennosti, Moscow, USSR]

Recipes for and proximate compositions of the following canned meat products are tabulated: goulash (control, 87% pork); goulash with 5% of pork replaced by hydrated Procon 2000 (PS) soy product; liver pate (control, 55% liver, 10% brains); liver pate with 5% PS and 8% brains; liver pate with 5% hydrated Mira Tex soy product and 8% brains; compositions of buckwheat groats with beef-head or pig-head meat; and pearled barley with beef-head or pig-head meat are also tabulated. Further tabulations present contents of component amino acids and relative biological values determined using *Tetrahymena pyriformis*. It is concluded that new high-value canned meat formulations may be obtained by inclusion of meat by-products and soy products. [See FSTA (1980) 12 8S1280.] SKK

### 35

Possibilities of the application of flavours in meat products. [Lecture]

Polic, M.; Trumic, Z.; Modic, P.

*Proceedings of the European Meeting of Meat Research Workers* No. 24, K9:1–K9:5 (1978) [8 ref. En, de, fr, ru] [Yugoslav Inst. of Meat Tech., Belgrade, Yugoslavia]

(i) semi-dry sausages and (ii) canned sterilized ground meat, both containing ≥ 25% meat and ≥ 20% meat emulsion together with edible offal, fatty tissue, pork rinds, additives and spices; and (iii) liver paste containing 10% pig head meat and 15% ground pig liver together with pig fatty tissue, water, additives and spices were made without added flavourings, or with addition of 0.3, 0.5 or 1.0 Pork BZ 1032, Meat TA 212 or Meat TA 2410/15 flavours (manufactured by 'Givaudan', Dübendorf, Switzerland) to (i) and (ii); or of the same quantities of Liver Intensifier 85802 (also 'Givaudan') to (iii). (i) in artificial casings were heat-treated and smoked, and (ii) and (iii) were sterilized in cans. All variants were assessed organoleptically on intensity of taste and aroma. It is concluded that best results were obtained from addition of 0.3% BZ 1032 and 0.5% Meat TA 212 to (i) and (ii); that Meat TA 2410/15 produced unspecific taste and aroma in them; and that 0.5% Liver Intensifier gave the best results with (iii). [See FSTA (1980) 12 8S1280.] SKK



## 36

**Organoleptic examination of canned ready to eat meat casserole specialities.** [Lecture]

Rantsios, A. T.

*Proceedings of the European Meeting of Meat Research Workers* No. 24, C10:1-C10:4 (1978) [3 ref. En, de, fr, ru]

Hellenic traditional habits and the large numbers of Greeks travelling or living temporarily or permanently abroad create a demand for canned ready-to-eat preparations of meat with a variety of vegetables. 30 canned products (from 4 manufacturers) based on meat, dry beans, rice, potatoes, string beans, green peas, spinach, onions, and sauce were examined organoleptically by a panel of 10 persons who were asked to complete a questionnaire which included 21 questions covering appearance, acceptability before consumption, impression gained during consumption of the different constituents of the product separately or together, and general acceptability after consumption. The need for a complex questionnaire is defended and its advantages are stressed. It is thought that the grade of unacceptability of a product should not exceed 2 on a 5-point scale for all characteristics evaluated, and that for tenderness and general acceptability, the score should be  $\geq 3$ . [See FSTA (1980) 12 8S1280.] SKK

## 37

**Phospholipid content in *M. longissimus dorsi* of hogs and influence of different procedures of mechanical and heat treatments on phospholipid changes.**

[Lecture]

Djordjevic, V.; Bucar, F.; Djujic, I.; Radovic, N.

*Proceedings of the European Meeting of Meat Research Workers* No. 24, J5:1-J5:6 (1978) [30 ref. En, de, fr, ru] [Yugoslav Inst. of Meat Tech., Belgrade, Yugoslavia]

Samples of *longissimus dorsi* muscle taken 24 h after slaughter from chilled carcasses (75-85 kg dressed wt.) of 6-months-old female white pigs were used. Portions were either homogenized, or cut into pieces and treated with 20% brine at  $-12^{\circ}\text{C}$  by 10% addition or injection. Homogenates and pieces were pasteurized in cans at  $80^{\circ}\text{C}$  for 30 min until  $70^{\circ}\text{C}$  was reached in can centre, or similarly sterilized at  $118^{\circ}\text{C}$  for 30 min to  $115^{\circ}\text{C}$  in can centre; and pieces were rubbed with salt and roasted at  $180-200^{\circ}\text{C}$  to a temp. of  $65-70^{\circ}\text{C}$  in the centre. Phospholipids were determined in all variants by Florisil column chromatography and TLC on Silicagel G, 9 of the 12 fractions separated being identified; and peroxide and thiobarbituric acid values and free fatty acid contents were determined. The results are tabulated. Phospholipid and oxidative changes are discussed in relation to the nature and severity of treatment. [See FSTA (1980) 12 8S1280.] SKK

## 38

**On the bacterial levels in pickles for canned hams.** [Lecture]

Zeuthen, P.

*Proceedings of the European Meeting of Meat Research Workers* No. 24, K1:1-K1:6 (1978) [3 ref. En, de, fr, ru] [Food Tech. Lab., Tech. Univ. of Denmark, 2800 Lyngby, Copenhagen, Denmark]

Examination of curing pickle for bacterial counts was carried out at various stages of production in 4 factories which together manufacture well over half of the Danish output of canned hams. 1 factory sterilized the overflow pickle in a UV sterilizer before recirculation, 1 passed the overflow pickle through a Zeiss [? Seitz] sterilizing filter during part of the tests, but not later, and 2 used no sterilization. No noteworthy differences in bacterial counts of pickles were found between factories, or in numbers of bacteria in finished hams. It is concluded that, provided bacterial counts of mixtures of fresh and recycled pickle are reasonably low, there is no advantage in sterilization or decontamination of overflow pickle. [See FSTA (1980) 12 8S1280.] SKK

## 39

**Examination of weight values of some parts of pork sides intended for the production of canned pasteurized products.** [Lecture]

Gajger, O.; Petricevic, A.; Mihajlovic, B.; Sabljic, B.; Kralik, G.

*Proceedings of the European Meeting of Meat Research Workers* No. 24, F4:1-F4:6 (1978) [10 ref. En, de, fr, ru] [Yugoslav Inst. of Meat Tech., Belgrade, Yugoslavia]

A total of 174 randomly selected carcasses of Yugoslav meat pigs (crosses of Large White and Dutch and Swedish Landrace), consisting of 41 weighing 70.17 kg on average, 105 weighing 87.14 kg on average, and 28 weighing 105.87 kg on average, and classified resp. into Yugoslav standard groups I (65-75 kg), II (76-100 kg) and III (101-110 kg) were examined. The carcasses were customarily cut (cut lines illustrated), and legs and shoulders were cut, boned and trimmed for commercial canning. Mean values with s.e. are tabulated for wt. % of (i) leg or shoulder in side, (ii) leg or shoulder meat in side and (iii) meat in leg or shoulder; and correlation and regression coeff. of the variables studied are presented. (i)-(iii) values decreased for leg and increased for shoulder with increase in side wt. throughout the groups. Within groups, (i) increased in I and decreased in II and III for leg, and increased in I and II and decreased in III for shoulder; (ii) decreased in I-III for leg, and increased in I and II and decreased in III for shoulder; and (iii) decreased in I-III for leg, and increased in I and II but did not change in III for shoulder. It is concluded that group I was particularly suitable for production of canned ham; group II was particularly suitable for production of canned shoulder, and group III was unsuitable for either purpose. [See FSTA (1980) 12 8S1280.] SKK

## 40

**[Effect of rotation and of sterilization regimes on physico-chemical changes in canned poultry meat.]** [Lecture]

Khlebnikov, V. I.; Kakhorov, M. K.; Bobrikova, E. G.

*Proceedings of the European Meeting of Meat Research Workers* No. 24, F13:1-F13:6 (1978) [5 ref. Ru, de, en, fr] [Nauchno-Proizvodstvennoe Ob"edinenie Ptitsepererabatyvayushchei & Kleezhelatinovoi Promyshlennosti 'Kompleks', Moscow, USSR]

250-g cans of poultry meat were sterilized in a rotary 'Rotomat-S' autoclave at 15 rev/min at  $120^{\circ}$ ,  $125^{\circ}$ ,  $130^{\circ}$ ,



or 135°C after achievement of constant lethal effect ( $F = 10$ ); and changes in contents of total sulphhydryl groups, disulphide groups,  $H_2S$ , total N, protein N, and amino N in comparison with untreated meat; and appearance, colour, odour, consistency, taste and juiciness; as well as in-vitro digestibility by proteolytic enzymes of the treatment variants were determined. Duration of sterilization at 135°, 130° and 125°C was reduced by 27.5, 20.0 and 12.5% resp. in comparison with sterilization at 120°C. It is concluded from results tabulated and graphically presented in detail that increase of sterilization temp. to 130–135°C with corresponding decrease in duration reduced hydrolytic and oxidative changes in proteins and increased their digestibility; however, sterilization at 125°C produced the best organoleptic quality. [See FSTA (1980) 12 8S1280.] SKK

#### 41

[TLC determination of 6,6'-ethylene-bis(2,2,4-trimethyl)1,2-dihydroquinoline (XAX-M). II. Lard, poultry fat and canned poultry products.]

Dünnschichtchromatographische Bestimmung von 6,6'-Äthylen-bis(2,2,4-trimethyl)1,2-dihydrochinolin (XAX-M). II. Schmalz, Geflügelfett und Geflügelkonserven.

Rödel, I.

*Nahrung* 23 (5) 569–571 (1979) [De] [Bezirks-Hygiene-Inspektion & -Inst., Berlin]

XAX-M is extracted from the food with n-hexane; the extract is then purified by partition between acetonitrile and hexane, and separated by TLC on silica gel G, using an acetone/benzene/n-heptane (1:1:3) solvent system. XAX-M flecks on the chromatogram are detected by spraying with a 2% solution of  $FeCl_3$  in 1N  $H_2SO_4$ ; XAX-M concn. are evaluated by comparison with reference samples. Detection limit is 0.1 µg; recovery (for 300 µg added XAX-M) is 100% for lard, 90% for poultry fat. [See preceding abstr. for part I.] IN

#### 42

Reliability of the tinplate can for packaging of radappertized beef under production conditions.

Killoran, J. J.; Howker, J. J.; Wierbicki, E.

*Journal of Food Processing and Preservation* 3 (1) 11–24 (1979) [8 ref. En] [US Army Natick Res. & Development Command, Food Eng. Lab., Natick, Massachusetts 01760, USA]

As a container for irradiation processed foods, the physical, chemical, and protective characteristics of tinplate were re-evaluated. In providing γ ray irradiated beef in a tinplate can for wholesomeness studies, the reliability of this container for radappertized beef was determined over a significant production period. The production data showed that it is feasible to reliably prepare the cans of beef in a commercial plant, transport the frozen cans of beef packed in fibreboard boxes on commercial equipment, irradiate the frozen cans of beef, transport the radappertized cans of beef at ambient temp. a distance of 1200 miles, and store the non-refrigerated cans of beef over a 2-yr period without any adverse effects on the beef. AS

#### 43

How much collagen in Australian canned meats?

Board, P. W.; Montgomery, W. A.; Rutledge, P. J.

*CSIRO Food Research Quarterly* 39 (3/4) 70–71 (1979) [5 ref. En] [CSIRO Div. of Food Res., N. Ryde, NSW, Australia]

146 samples of canned meats (corned beef, corned beef with cereal, ham, cured pork shoulder, and comminuted ham products) were taken at random from canning lines in 11 meat canneries in several States. Collagen, moisture, salt, fat and protein contents were determined. The tabulated results show that in Australian corned beef the mean % of collagen in total protein was 14%. The variation from 12–18% in the means for the 6 lots examined arises from variation in the quality of the animals processed and in the type and proportions of different cuts used. Corned beef with cereal had a mean % of collagen in total protein of 12.5%, range 9.5–13.9%. In canned hams and pork shoulders the average amount of collagen in total protein was < 10%. Comminuted ham products are prepared from mixed cuts, including trimmings from the major cuts, and the collagen content tends to be higher. VJG

#### 44

[Modern storage methods.]

Tolic, M.; Pavlovic, V.

*Tehnologija Mesa* 20 (6) 179–182 (1979) [7 ref. Sh, en] [Prehrambena Industrija 'Podravka' Koprivnica, Yugoslavia]

Advantages of high-rack stores are discussed, with reference to optimization of design, and allowance for subsequent extension of the installation. Integration of production facilities, storage facilities etc. for canned meat products is discussed. Practical aspects of operation of high-rack stores are considered, with reference to keeping records of the stored products, control procedures, and withdrawal of foods from storage. STI

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FAB 51

MEAT CANNING

SELECTED FROM VOLUME 13

FOOD SCIENCE AND TECHNOLOGY ABSTRACTS

under the direction of:-

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H. BROOKES  
EDITOR





1

[Occurrence of cadmium in some types of foods.]

Pavelka, J.; Sebesta, J.

*Veterinarni Medicina* 24 (12) 737-744 (1979) [4 ref. Cs. ru. en. de] [Statni Vet. Ustav, 723 08 Ostrava-Martinov, Czechoslovakia]

Occurrence and concn. of Cd (classified from absence to 10.00 mg/kg in 8 steps) is tabulated for 280 samples of 10 marine fish, 4 fresh-water fish, and livers of 1 marine and 1 fresh-water fish; 136 samples of 11 canned marine fish products; 170 samples of 3 canned meat products, a meat paste and a meat soup; and 146 samples of 23 kinds of cereal and vegetable products. It is concluded that 95% of the canned marine fish products, 94% of the marine and fresh-water fish, 69.9% of the vegetable products, and 32.9% of the meat products exceeded the max. Czechoslovak tolerance level of 0.02 mg Cd/kg. Checking of the AAS method used showed that the results were influenced by presence of NaCl, quantities of 1-3% requiring correction, and the method becoming unsuitable with quantities > 3%. The Cd recovery after ashing was 85%. SKK

2

[Correlation between structural-mechanical properties and mincing parameters of 'Kroshka' canned meat product for babies.]

Kosoi, V. D.

*Myasnaya Industriya SSSR* No. 12, 7-10 (1979) [7 ref. Ru] [Moskovskii Tekh. Inst. Myasnoi i Molochnoi Promyshlennosti, Moscow, USSR]

Studies were conducted to determine the optimum parameters for mincing of poultry meat in the manufacture of 'Kroshka', a canned homogenized poultry meat product with a fluid consistency, thickened with starch and containing 0.3% NaCl. The relation between the characteristics of the homogenized product (limiting shear strength, water binding capacity) and homogenization parameters (number of homogenizations, and the stator/rotor gap width of the colloid mill) is discussed. It is concluded that optimum properties are achieved by 2 milling operations at a gap width of 0.35 mm, 3 milling operations at a gap width of 0.5 mm and 4 milling operations at a gap width of 0.7 mm. STI

3

Antibotulinal efficacy of sulfur dioxide in meat.

Tompkin, R. B.; Christiansen, L. N.; Shaparis, A. B.

*Applied and Environmental Microbiology* 39 (6) 1096-1099 (1980) [28 ref. En] [Swift & Co., Res. & Development Center, Oak Brook, Illinois 60521, USA]

The addition of sodium metabisulphite as a source of SO<sub>2</sub> delayed botulinal outgrowth in perishable canned comminuted pork when it was temp. abused at 27°C. The degree of inhibition was directly related to the level of SO<sub>2</sub>. Levels of > 100 µg SO<sub>2</sub>/g were necessary to achieve significant inhibition when a target level of 100 botulinal spores/g was used. Sodium nitrite partially reduced the efficacy of the SO<sub>2</sub>. SO<sub>2</sub> offers a new option for the control of botulinal outgrowth in cured or noncured meat and poultry products. AS

4

Specification for canned ham.

Barbados, Barbados National Standards Institution  
*Barbados National Standards* BNS 85:1979, 14pp. (1979) [En]

This standard covers raw material, preparation, processing, additives and finished product requirements. Specific requirements include: NaCl, 1.5-3.5%; nitrate content (expressed as sodium nitrate), < 0.05%; nitrite content (expressed as sodium nitrite), < 0.02%; and min. meat (fat-free) protein, 16.5% (calculated on total can contents and corrected for gelatin if added). The product shall conform to prescribed limits for microbiological activity and for metallic impurities, viz. As, < 1 p.p.m.; Pb, < 5 p.p.m.; Cu, < 15 p.p.m.; Zn, < 19 p.p.m.; and Sn, < 140 p.p.m. Packaging (cans) and sampling are also covered. KME

5

[Canned meats.]

Union of Soviet Socialist Republics, Gosudarstvennyi Komitet SSSR po Standartam

*Soviet Standard* GOST 9937-79, 4pp. (1979) [Ru]

This standard, which supersedes GOST 9937-62 and 13102-67, applies to canned meats prepared from meat, bread flour, fried onion, spices and salt. It prescribes 3 types of meat: beef, pork and mutton, and covers other ingredients and general requirements for processing, specifying meat content (≥ 70%), sauce content (≤ 30%), cooking salt (1.0-1.8%), and Sn salts (≤ 200 mg/kg); Pb salts are not permitted. Testing methods, packaging (cans), transport and storage (up to 2 yr in cans, up to 3 yr in glass and bulk containers) are also covered. KME

6

Nitrites and nitrosamines in meat food products.

Food Safety and Quality Service.

United States of America, Department of Agriculture  
*Federal Register* 45 (126, June 27) 43447-43452 (1980) [En] [Washington, DC, USA]

The current test procedure for the detection and detn. of nitrosamines in meat food products by the USDA is to utilize a Thermal Energy Analyser (TEA) to screen samples. Samples containing ≥ 10 parts/billion are subject to confirmation by the gas chromatography/MS (GC/MS). Tests have failed to find confirmable levels of nitrosamines in uncooked pumped bacon. Nitrosation (resulting in nitrosamine formation) apparently results from the heat of cooking. From 5 to 17% of the TEA-tested samples contained nitrosamines at levels expected to be confirmed by GC/MS. A high incidence of confirmable levels of nitrosamines were found in bacon (cured pork bellies) made with dry curing materials. With dry cured hams and pork shoulders, GC/MS results were consistently and appreciably lower than findings by TEA on the same samples. A problem may exist with immersion cured bacon but too few samples were examined to be representative. Confirmable levels of nitrosamines were not found in fermented sausages, cooked sausages, pickle-cured products (other than immersion cured bacon), perishable canned products, shelf-stable products, or sterile canned products. CAS



**Thermal processes for canned low-acid foods. II. Meat products: adobo (pork-chicken) binangoongan, menudo and tocino.**

Parian, F. E. G.; Embuscado, M. E.; Go, R. C.; Gonzales, O. N.

*NSDB Technology Journal* 5 (1) 9-20 (1980) [17 ref. En] [Food Tech. Res. Div., Nat. Inst. of Sci. & Tech., NSDB, Manila, Philippines].

Formulation studies were done on 4 canned local meat recipes namely: adobo (pork-chicken), binangoongan, menudo and tocino. Min. thermal processing requirements specific for these 4 formulations were determined by correlating the results of the thermal death time studies, using *Clostridium sporogenes* PA 3679 as the reference organism, and heat penetration tests using a still retort. Min. processes at 240°F (115.6°C) and 250°F (121.1°C) were calculated to allow a spoilage of one can/10<sup>5</sup> cans, using Stumbo's mathematical method. The calculated min. process for a 307 × 409 can was used as basis for calculating similar processes for other can sizes. The validity of these calculations remain to be verified by storage studies. [See FSTA (1980) 12 3]346 for part I.] UPLB

## 8

**[Effect of storage conditions (time and temperature) on some components determining the nutritive value of sterilized meat dishes.] Einfluss der**

Lagerbedingungen (Zeit und Temperatur) auf einige Nährwert-bestimmende Bestandteile von sterilisierten Fleischgerichten.

Rogowski, B.

*Fleischwirtschaft* 60 (6) 1226-1229 (1980) [8 ref. De, en] [Bundesanstalt für Fleischforschung, 8650 Kulmbach, Federal Republic of Germany]

2 commercial sterilized ready-to-eat meat products (i.e. beef goulash and roast pork from 2 manufacturers, each in 10 kg cans and 2 kg trays) were analysed for vitamins B<sub>1</sub> and B<sub>2</sub> and for amino acid contents and availability. Analyses were performed immediately after purchase and after 3, 6 and 12 months storage at 12° and 20°C. Tabulated results showed falls in vitamin concn. during storage, especially of thiamin, in beef goulash in 10 kg cans (up to 50% reduction, vs. 33% reduction in roast pork). Losses tended to be greater at the higher temp., but the differences were not statistically significant. Amino acid contents were also reduced after 1 yr storage, but availability was not greatly affected. As in the vitamin studies, losses were greater in 10 kg cans than in 2 kg trays and storage temp. was of minor importance, but greater losses occurred in roast pork than in beef goulash. Of the essential amino acids determined, methionine, phenylalanine and threonine were most susceptible to storage loss. RM

## 9

**[Standard for canned corned beef.]**

Thailand, Thai Industrial Standards Institute

*Thai Standard TIS 282*, 10pp. (1978) [Th] [Min. of Ind., Bangkok 4, Thailand]

## 10

**Development of concentrated meat gravies.**

Kadkol, S. B.; Madhwaraj, M. S.; Nair, P. R.; Nair, K. K. S.; Dhanaraj, S.; Govindarajan, V. S.; Baliga, B. R.

*Journal of Food Science and Technology, India* 17 (3) 146-149 (1980) [5 ref. En] [Cent. Food Tech. Res. Inst., Mysore-570 013, India]

6 types of meat gravies (Mutton Kashmiri, Mutton Moghalai, Mutton Neelagiri Koorma, Mutton Palak, Mutton Coconut Curry and Mutton Dhanasak) were prepared using meat, vegetables, green leaves, spices, oil, curd, pulse dhal and other ingredients. The chemical composition of the gravies was determined. After canning they were stored for 1 yr at -10°, 25-30°, or 37°C before organoleptic evaluation by panellists. All the canned meat gravies were acceptable by the panellists after 1 yr of storage. Cost data worked out for producing 1 t of Mutton Kashmiri indicated the ex-factory cost to be Rs 6.00/can (304 × 309 size). CFTRI

## 11

**Different levels of collagen in canned meat loaf.**

Pimentel, L. A.; Sison, E. C.

*Philippine Agriculturist* 63 (1) 20-27 (1980) [13 ref. En] [Dep. of Food Sci. & Tech., Univ. of Philippines at Los Banos, College, Laguna, Philippines]

3 sources of collagen, i.e. water buffalo (i) abomasum, (ii) rumen or (iii) a 1:1 reticulum/rumen mixture, were each substituted, at 5 levels, for part of the water buffalo meat in a canned meat loaf product. Effects on the physical, chemical and nutritional value of the resulting product were evaluated. The results show these collagen-rich materials increased tenderness and juiciness, but that protein and fat content, % cooking yield, cooking stability %, water-holding capacity %, shear force, appearance score, flavour score and general acceptability score decreased with increasing (i), (ii) or (iii) content. Max. levels giving no impairment of product quality were 10% for (i) and (iii), 15% for (ii). UPLB

## 12

**Proposals for the compositions of different sorts of canned meat regard to their protein value and manufacturing technology. [Lecture]**

Dworschak, E.; Molnar, L.; Horvath, E. D.; Vukov, K. *Proceedings of the European Meeting of Meat Research Workers* No. 25, 13.3:975-13.3:980 (1979) [En, de, fr, ru] [Inst. of Nutr., Univ. of Hort., Budapest, Hungary]

The authors determined the nutritional value of proteins of different components used for canned meat production according to Morup-Olesen index (based on Kofranyi's human experiments). Protein values of 55 mixtures of pairs of protein components were calculated by computer, the protein ratios having a stepwise variation of 5%. Protein mixtures of beef-rice,



beef-wheat flour, yeast-rice, egg-pea, wheat flour-bean, wheat flour-yeast, wheat flour-pea were of significantly higher values than the single components. On the basis of the calculations, some technological proposals are made for the composition of canned meat approaching the optimum with regard both to its protein value and organoleptic characteristics. [See FSTA (1981) 13 5S668.] STI

## 13

[Influence of storage time and temperature on some of the constituents determining the nutritive value of sterilized ready-to-eat meat meals.] Einfluß der Lagerdauer und -temperatur auf einige den Nährwert von sterilisierten Fleischgerichten bestimmende Bestandteile. [Lecture]

Rogowski, B. M.

*Proceedings of the European Meeting of Meat Research Workers* No. 25, 7.7:597-7.7:603 (1979) [8 ref. De, en, fr, ru] [Bundesanstalt für Fleischforschung, Kulmbach, Federal Republic of Germany]

2 types of retail sterilized meat-based meals (beef stew, roast pork), each produced by 2 different manufacturers, were studied. Products from 1 manufacturer were packaged in 10-kg cans, those of the other manufacturer were packaged in 2-kg Al trays. Vitamin B<sub>1</sub> and vitamin B<sub>2</sub> contents and amino acid contents and availabilities were determined immediately after purchase, and after storage at 12° or 20°C for up to 1 yr. Concn. of both vitamins decreased during storage; vitamin concn. were higher in the products in 2-kg trays than in those in 10-kg cans. Storage temp. had little effect on vitamin retention. Both content and availability of amino acids decreased during storage, the decreases were greater in 10-kg cans than in 2-kg trays; storage temp. had little effect on these changes. Amino acid retention was greater in beef stew than in roast pork. [See FSTA (1981) 13 5S668.] STI

## 14

Effect of heat treatment on protein-quality and sensory changes in canned food. [Lecture]

Eskeland, B.; Martens, M.; Russwurm, H.

*Proceedings of the European Meeting of Meat Research Workers* No. 25, 7.6:591-7.6:596 (1979) [11 ref. En, de, fr, ru] [Norwegian Food Res. Inst., N-1432 Aas NLH, Norway]

Experiments were carried out to study the effects of different heat treatments of canned meat products on net protein utilization (NPU) and sensory changes. Samples of raw liver paste and meat balls were autoclaved at the same temp. as used in conventional processing, but for different times, resulting in F-values of 1.9, 2.7, 5.6 and 12.3 for liver paste and 2.7, 7.4 and 14.6 for meat balls. The raw and commercial products from the same batch were also used in these experiments. Liver paste autoclaved at F-values of 1.9 and 2.7 had the same NPU as the raw product (65-66); samples autoclaved at F-value 5.6 had significantly lower NPU (62.9). A further decrease in NPU to 58.2 was observed at F-value 12.3, which was of the same order as that of the commercially processed sample. The NPU for meat

balls fell from 74.6 (raw product) to 64.9 after commercial processing. F-values of 2.7, 7.4 and 14.6 resulted in NPU of 69.7, 67.3 and 62.7, resp. High correlation coeff. were obtained between the reduction in NPU by increased heat treatment and the corresponding reduction in sensory quality of the products. [See FSTA (1981) 13 5S668.] STI

## 15

Quality control at high heated beef cans. [Lecture] Günther, H. O.

*Proceedings of the European Meeting of Meat Research Workers* No. 25, 5.7:293-5.7:295 (1979) [En, de, fr, ru] [Landesuntersuchungsamt für das Gesundheitswesen Südbayern, Ernsbergerstrasse 3, 8000 Munich 60, Federal Republic of Germany]

2 tests were carried out for quality control of high-heat canned beef (120°C for 50 min): detn. of bound glucose in water-soluble aroma compounds and detn. of glycopeptides in the same fraction. Both values were high after processing, but declined to zero during storage for 3-5 yr, depending on the quality of the starting meat. 20 mg/100 g may be regarded as the limit of acceptability for both the glucose and the peptides in canned meat. For routine purposes, detn. should be automatically controlled. [See FSTA (1981) 13 5S668.] STI

## 16

The influence of corn syrup solids and dextrose on the organoleptic qualities of canned, pasteurized hams. [Lecture]

Zeuthen, P.

*Proceedings of the European Meeting of Meat Research Workers* No. 25, 5.13:325-5.13:329 (1979) [2 ref. En, de, fr, ru] [Food Tech. Lab., Tech. Univ. of Denmark, Lyngby, Denmark]

In this experiment, 5 batches of canned hams containing various combinations of <3% dextrose and <2% corn syrup solids were subjected to sensory evaluation by a trained panel. Analyses of the contents of moisture, NaCl and of glucose (as % reducing sugars) were performed, and pH was measured. The results indicate that within a concn. of up to about 2.5% carbohydrate, expressed as reducing sugars, the organoleptic qualities of the hams were not affected. [See FSTA (1981) 13 5S668.] STI

## 17

[Influence of milk proteins on the amino acid composition of canned poultry meat.] [Lecture]

Gonotskii, V. A.; Serechenko, L. D.; Abramova, L. A.

*Proceedings of the European Meeting of Meat Research Workers* No. 25, 12.10:925-12.10:930 (1979) [8 ref. Ru, en, de, fr] [Nauchno-proizvodstvennoe Ob"edinenie Ptitsepererabatyvayushchei i Kleezhelatinovoi Promyshlennosti "Kompleks", Moscow, USSR]



New kinds of canned poultry meat of high nutritional value, made with milk proteins, were developed. Use of milk concentrates in canned poultry meat permits improvement of their amino acid composition. The total content of essential amino acids, especially lysine and valine, is increased by adding milk proteins (soluble whey protein) to the product. The results show that the amino acid composition of the canned products containing milk proteins is almost optimal. [See FSTA (1981) 13 5S668.] STI

## 18

**Simultaneous identification and quantitation of the food additives glutamate, guanosine 5'-monophosphate and inosine 5'-monophosphate by isotachophoresis.**

Kenndler, E.; Huber, J. F. K.

*Zeitschrift für Lebensmittel-Untersuchung und -Forschung* 171 (4) 292-296 (1980) [10 ref. En, de] [Inst. für Analytische Chem. der Univ. Wien, Währingerstr. 38, A-1090 Vienna, Austria]

An isotachophoretic method was developed for rapid and cheap simultaneous detn. of the flavour-enhancing additives monosodium glutamate (MSG), GMP and IMP in foods. Food samples are simply minced and extracted with water, and after centrifugation the supernatant is used directly for isotachophoresis. The electrolytic system chosen has a pH of 6.0 for efficient separation and for possible detn. of other food additives that are weak acids. No interference from food components was observed, even when very turbid samples were used. The method gave excellent linear response to increasing additive concn., and recoveries from spiked canned meat balls, onion soup and instant tomato soup were 92.6-101.4%. Precision was tested by measuring recovery 5 × from instant tomato soup + 5.0% (w/w) MSG; mean recovery was 98.6%, s.d. 0.8. Limit of detection corresponded to a concn. of approx. 10 p.p.m. of each additive in the food product. Contents of MSG and GMP in various canned and instant foods are tabulated (soups, sauces, bouillon cubes, and canned meat rolls in sauce and chili con carne.) DIH

## 19

**[Economics of bulk packaging of canned meat products and of lard in consumer packs.]**

Navratil, J.

*Prumysl Potravin* 31 (5) 247-248 (1980) [Cs] [Vyzkumny Ustav Masneho Prumyslu, Brno, Czechoslovakia]

Canned meat products and consumer packs of lard were bulk packaged in a BSF-1 packaging installation (Blanické Strojirny, n.p., Vlasim, Czechoslovakia). 415-g, 190-g and 80-g cans were packaged in polyethylene shrink film into units of 8, 14, or 18-36 cans, details of further stacking and palleting being given for each size; corresponding information is given on packaging lard into 250-g PVC tubs in 16-tub units closed with a common Al foil top in a BTK automatic machine, and bulk packaging 48-tub units on the BSF-1 machine as described above. Detailed costings of each variant are presented. Total costs (Kcs/t) tabulated vs. costs of conventional packaging in cartons were: 415-g cans,

250.10 vs. 434.60; 190-g cans, 338.30 vs. 492.40; 80-g cans, 1-layer (18 cans) 425.10 or 2-layer (36 cans) 283.60 vs. 393.20; and lard, 116.70 vs. 386.70. SKK

## 20

**[The effect of autolytic changes of meat and technological additives on the available lysine, methionine and cysteine contents in canned meat products.]** Einfluss autolytischer Veränderungen im Fleisch und der bei der Herstellung von Fleischkonserven verwendeten technologischen Zutaten auf den Gehalt an „available“ Lysin, Methionin und Cystein.

Janitz, W.

*Fleischwirtschaft* 60 (11) 2063-2066 (1980) [18 ref. De, en] [Inst. for Food Res., Agric. Univ., Mazowiecka 48, 60-623 Poznan, Poland]

24 different kinds of canned meat products, prepared with fresh meat, meat with advanced autolytic changes, and thawed frozen meat, as well as with curing salt with phosphates (2.5 g NaCl + 11 mg NaNO<sub>2</sub>, followed by 0.4 g polyphosphate/100 g meat), fat, a cold smoke preparation and potato starch were examined for changes in available lysine, methionine and cysteine. Results showed that changes in available methionine and cysteine were dependent mainly on the degree of autolytic changes in the meat. Adding phosphates during curing increased losses of available lysine and methionine during sterilization. Losses of available cysteine in canned products made from meat with advanced autolysis were increased by adding a cold smoke preparation, and reduced by fat or starch. AS

## 21

**Acceptability of canned ham of differing water content.**

Rhodes, D. N.; Nute, G. R.

*Journal of the Science of Food and Agriculture* 31 (9) 935-942 (1980) [5 ref. En] [Agric. Res. Council, Meat Res. Inst., Langford, Bristol BS18 7DY, UK]

Canned hams were produced containing 0-0.80% polyphosphate, and effects on sensory properties were evaluated by laboratory and consumer panels. A laboratory panel detected no significant increase in foreign flavour with increase in polyphosphate, and detected increase in texture and juiciness as 'added water' increased from 0 to 24%. For the consumer panel study canned hams containing 0, 10 and 27% added water (i.e. water contents of 73.7, 75.6 and 78.9% wet wt.) were produced and a 715-member panel rated them for texture, juiciness and overall acceptability on 5-point scale (0 = normal, -2 = negative extreme, +2 = positive extreme). Mean texture scores for 0, 10 and 27% added water were 0.105, 0.210 and 0.480, and mean juiciness scores were 0.080, 0.320 and 0.527, resp. Both sets of increases were highly significant. Corresponding mean acceptability scores were -0.04, 0.09 and 0.03; the difference due to added water being significant, but slight. Unsolicited comments indicated decreasing intensity of flavour with increased % added water. DIH



## 22

[Process for making meat preserves.]

Marchenko, A. P.; Neshkhlebov, A. I. (Union of Soviet Socialist Republics, Kazakhskii Filial Vsesoyuznogo

Nauchno-issledovatel'skogo Instituta Myasnoi Promyshlennosti)

*USSR Patent* 733 622 (1980) [Ru]

A process is described for making meat preserves by preparing the raw material, packing it in cans, adding dried skim milk and sterilizing. To reduce the sulphide corrosion of lacquered cans made from electrolytic tin plate, and preserve the nutritive value of the product, the dried skim milk is mixed with lactose. W&Co

## 23

Application of microcomputers in food factories. Whitman, W. E.

*IFST Proceedings* 13 (3) 169-175 (1980) [En]

Applications of microcomputers to minimize raw material losses in food factories are described for all parts of the manufacturing process from raw material receipt through ingredient preparation, blending, processing and packaging to dispatch. As well as controlling process parameters (on the basis of real time sensor input or previous data from simulation studies), microcomputers can be used for factory management by keeping track of materials and monitoring stocks, yields, performance, etc. Examples are given of microcomputer control of a canning operation and in a butchery. DIH

## 24

[Use of radiographic techniques in inspection of meat products.]

Francesco, I. de; Renon, P.

*Archivio Veterinario Italiano* 30 (3/4) 137-138 (1979) [1 ref. It] [Istituto di Ispezione degli Alimenti di Origine Anim., Univ. degli Studi di Milano, Milan, Italy]

The potential for use of radiography as a method for detection of defects in preserved meat products, sausages, etc. is discussed. An example is given of radiographic examination of a batch of Milan-type salami sausages, suspected of defective filling; the results of radiographic examination confirmed that gaps, cracks, etc. were present within some of these sausages, probably as a result of non-uniform distribution of sausage mix within the casing due to malfunction of the filling machine. It is, however, pointed out that the cost of radiographic examination makes it suitable only for checks on samples suspected of defects during routine examination by subjective techniques. AJDW

## 25

[Stability of prepared meals in relation to preservation processes. I. Trials with beef stew.]

Carbonell, J. V.; Valles, S.; Pinaga, F.

*Revista de Agroquímica y Tecnología de Alimentos* 20 (1) 103-111 (1980) [13 ref. Es. en] [IATA, Valencia, Spain]

Samples of beef stew were preserved by (i) freezing, (ii) freeze-drying and (iii) heat sterilization, and stored for 108 days at  $-18^{\circ}$  (i) or  $20-22^{\circ}\text{C}$  [(ii) and (iii)]. Samples were examined at intervals for sensory

properties (overall acceptability, intensity of off-flavours), peroxide value, colour and consistency of the sauce. Results, shown graphically and in tables, revealed that the frozen sample retained its original quality; the acceptability of the canned product decreased slightly with storage time, but the difference was not

- statistically significant. The freeze-dried sample was inferior to the other 2 even at the start of storage (5.3 on a 9-point scale, vs. 6.4 and 6.5 for frozen and canned products) and was no longer acceptable after 78 days storage (3.8). The loss of quality was due to oxidative degradation: after a brief induction period the peroxide value increased from 0 to 2 at 18 days, to about 30 at 78 days and to 64 m-equiv./kg of fat (separated from the sauce by centrifugation) in freeze-dried samples, but did not change in the other 2. Similar changes were noted for colour. The consistency of the sauce varied very little during 80 days' frozen storage, and much less than that of canned or freeze-dried product even after 108 days. RM

## 26

Sensory profiling of canned boned chicken: comparisons of retail, school lunch, and military canned boned chicken.

Lyon, B. G.; Klose, A. A.

*Journal of Food Science* 45 (5) 1336-1340 (1980) [7 ref. En] [USDA, SEA, Anim. Products Composition & Utilization Res. Unit, Richard B. Russell Agric. Res. Cent., PO Box 5677, Athens, Georgia 30613, USA]

Lack of domestic retail markets and poor quality and acceptance have hampered optimum use of spent fowl (old laying hens) as a highly nutritious, inexpensive, and convenient food. Major outlets for canned boned chicken have been developed through USDA and military food programmes. The purpose of this study was to compare canned boned chicken products (USDA, military, and retail) using quantitative descriptive analysis techniques. In general, USDA school lunch products were characterized as having more ground and shredded meat constituents than the retail or military products. School lunch products were also less tender and cohesive, quicker to break down on mastication, less juicy, more off-flavoured, and less desirable than the retail and military products. Through factor analysis and calculations of factor scores, the original set of 12 numbers to characterize a product was reduced to 4 numbers that revealed the extent to which products exhibited attributes represented by the factors. All USDA and military products met their min. specifications for proximate composition and yield. However, USDA school lunch products varied in ranges of moisture, fat, protein, and drained wt. IFT



## 27

**Sensory profiling of canned boned chicken: sensory evaluation procedures and data analysis.**

Lyon, B. G.

*Journal of Food Science* 45 (5) 1341-1346 (1980)  
[16 ref. En][USDA, SEA, Anim. Products Composition

&amp; Utilization Res. Unit., Richard B. Russell Agric. Res. Cent., PO Box 5677, Athens, Georgia 30613, USA]

Quantitative descriptive analysis techniques were explored to develop procedures to identify primary defects in product quality of canned boned chicken from spent fowl. An extensively trained panel identified 12 sensory attributes important to the discrimination of differences among various sources of canned chicken. Through factor analysis the 12 sensory attributes were distributed into 4 general categories: texture, juiciness, off-flavour, and appearance. Elimination from factor analysis of those attributes which showed little or no contribution to product differentiation increased the cumulative variance accounted for in the data from 68.8% (with all attributes) to 77.4% (with 3 attributes omitted) and factors which represented texture, juiciness, and off-flavour showed increases in the portion of variance explained. The appearance factor showed a slight decrease. Texture attributes made the greatest contribution to product differentiation by the trained panel as determined by factor analysis. Further work with large consumer panels would be needed to estimate the contribution that individual attributes make to the perceived desirability of the products. IFT

## 28

**Effects of heat processing in cans and retort pouches on sensory properties of fowl meat.**

Lyon, B. G.; Klose, A. A.

*Journal of Food Science* 46 (1) 227-230, 233 (1981)  
[12 ref. En][USDA, SEA-AR, Richard B. Russell Agric. Res. Cent., PO Box 5677, Athens, Georgia 30604, USA]

Fowl meat processed in cans and flexible retortable pouches was evaluated for heat effects on sensory properties. A trained panel evaluated texture and off-flavour of canned boned chicken, uncooked fowl meat retorted in flexible pouches, cooked meat retorted in flexible pouches, and simmered fowl meat (control). Results indicated that the retort pouch process may offer a method for improving the texture of processed fowl meat from spent hens by adequately cooking to tenderize the meat but not overcooking it to the extent that meat chunks are reduced to fibrous, shredded, or stringy components. Off-flavour development was related to precooking before retorting. IFT

## 29

**[Pheasant carcass portioning.]**

Isakov, M.; Vojinovic, G.

*Tehnologija Mesa* 21 (1) 21-24 (1980) [23 ref. Sh, en]  
[Jugoslovenski Inst. za Tehnologiju Mesa, Belgrade, Yugoslavia]

Trials were aimed at finding possible ways of processing excess pheasants into a tinned product. Detailed data on wt. of pheasant body parts (in % of total) for both sexes, including inedible parts and entrails, are given. STI

## 30

**[Studies on meat products for the Near and Middle East.]**

Pezet, P.

*RTVA* 19 (160) 27-33 (1980) [Fr]

After an initial discussion of the international market for canned meat products and declining exports of canned meat products from France, studies on canned or frozen meat products for export to the Near and Middle East (Iran, Jordan, Egypt, Saudi Arabia) are described. Aspects considered include local dietary customs and preferences, locally available canned meat products, products developed for this region, and market testing. Prospects for successful export of canned meat products to this market are discussed. AJDW

## 31

**[Methods and economic grounds for making proteins based on brewer's yeast and blood plasma in Yugoslavia.]**

Gajger, O.; Ratkovic, D.

*Tehnologija Mesa* 21 (2) 40-42 (1980) [9 ref. Sh, en]  
[Jugoslovenski Inst. za Tehnologiju Mesa, Belgrade, Yugoslavia]

Yugoslav legislation permits addition of 3% of proteins of non-meat origin into canned meat products and smoked products; therefore the possible utilization of brewer's yeast (a by-product from beer fermentation) and blood plasma (slaughterhouse by-product) in dried form was studied. Belvit S is manufactured from residual brewer's yeast; manufacture of blood plasma is difficult due to problems associated with accumulation of blood, plasma separation and plasma drying. The available amounts of Belvit S and blood plasma seem to fully satisfy the needs of the meat industry. Data on beer manufacture and the relevant brewer's yeast yield, and available blood for plasma are given for the Yugoslav republics. STI

## 32

**Method and device for compressing meat.**

Langen, J. C.; Langen, C. P.

*United States Patent* 4 237 581 (1980) [En]

To prevent loss of meat juice during compression of meat for e.g. canned ham, portions of meat are pressed in consecutive chambers, whilst the meat juice released during 1 compression run is added to a meat portion to be treated in the next run. RAW

## 33

**[Effect of autolysis of beef on the quality of preserved products.]**

Bol'shakov, A. S.; Zabashta, A. G.; Khakimdzhanov, A. B.; Oreshkin, E. F.

*Izvestiya Vysshikh Uchebnykh Zavedenii, Pishchevaya Tekhnologiya* No. 4, 99-101 (1980) [5 ref. Ru][Moskovskii Tekh. Inst. Myasnoi i Molochnoi Promyshlennosti, Moscow, USSR]

Effects of the post-slaughter storage period of bovine *longissimus dorsi* muscle on the quality of canned products made therefrom were evaluated; data are presented for the solid/liquid phase ratio, pH, juiciness etc. of the canned products. The results show that meat



held for 4 h after slaughter gives the best canned product quality. Use of such meat also reduces energy costs and wt. losses, due to the reduced chilling period. STI

### 34

[Canned poultry meat production.]

QP Corp.

*Japanese Examined Patent* 5 542 609 (1980) [Ja]

Process is described in which bones are removed from cooked poultry meat, the resultant product then being immersed in a solution of polyphosphate and protease. IFT

### 35

[Effect of cooking salt, nitrites, nitrates and phosphates in canned meat products on corrosion of aluminium cans.]

Lucic, D.; Simic, N.

*Tehnologija Mesa* 20 (12) 353-355 (1979) [Sh, en]

[Jugoslovenski Inst. za Tehnologiju Mesa, Belgrade, Yugoslavia]

The resistance of Al to corrosion was low in canned meat products incorporating various curing salts, due to the effect of  $Al_2O_3$ , with consequent corrosion of the surface and eventual formation of off-flavours.

Lacquering is recommended to combat this problem. STI

### 36

[Isolation of *Clostridium botulinum* B strains from blown cans of meat.]

Skoczek, A.; Mierzejewski, J.

*Medycyna Weterynaryjna* 35 (12) 736-738 (1979)

[19 ref. Pl, ru, en] [Osrodek Naukowo-Badawczy Sluzby Weterynaryjnej, Pulawy, Poland]

1023 cans of various meat products which had become blown after storage were examined. Isolation and identification of clostridia were carried out by generally accepted procedures. The results are fully described. 430 strains of anaerobic sporeformers were isolated, of which 366 had morphological, cultural and biochemical characteristics corresponding to those of the *C. sporogenes/C. botulinum* group. 9 of these strains were found to produce botulinus neurotoxin.

Endospores of 4 of the strains showed higher heat resistance than the control *C. botulinum* strain no. 1162, 420-600 min at 100°C vs. 120 min at 100°C being required for kill. SKK

### 37

[Antibiotic properties against *Clostridium botulinum* B of *Clostridium sporogenes* strains isolated from canned meat.]

Mierzejewski, J.

*Medycyna Weterynaryjna* 35 (4) 220-222 (1979) [9 ref. Pl, ru, en] [ul. Krancowa 1/15, 24-100 Pulawy, Poland]

249 strains of *C. sporogenes* isolated from 500 blown meat cans that had been kept 1-4 yr without refrigeration (including 178 isolated from 287 cans of ground pork) were examined. 56 (22%) of the strains

were found to produce bacteriocines against *C. botulinum* B 1162. Cultures of the 4 most active strains reached max. activity after incubation for 2-3 days. The strains exhibited antibiotic activity also against *C. perfringens* A and a museum strain of *C. sporogenes*, but to a lesser extent than against *C. botulinum*. SKK

### 38

[Characterization and technological evaluation of bacteriological thermal tests of canned meat pasteurization.]

Wojciechowski, J.

*Roczniki Akademii Rolniczej w Poznaniu Rozprawy Naukowe* No. 101, 52pp. (1980) [99 ref. Pl, en, ru]

Use of *Streptococcus faecalis* 509 and *Str. faecium* 1861 as test strains for assessment of microbiological quality of pasteurized non-cured meat was studied. Graphs and tables show results of thermal destruction studies for the 2 strains. Decimal reduction times (D values) varied from approx. 52 min at 60°C to 5 min at 95°C; z values were 41-42°C. Partial thermal death time curves are given for use in detn. of thermal resistance of aerobes as a function of the pasteurization number at 65-80°C. Relation of the work to studies of uniformity of heating within cans, selection of size and shape of cans and associated energy problems is discussed. [From En summ.] DIH

### 39

[Nitrites in meat products.]

Dacic, M.; Jovanovic, G.; Babic, L.

*Hrana i Ishrana* 21 (5/6) 113-115 (1980) [7 ref. Sh, en] [Vet. Fak., Belgrade, Yugoslavia]

A total of 150 samples of meat products from shops in Belgrade was analysed for nitrite. Ranges of values for nitrite concn. (with number of samples studied in parentheses) were (mg%): cooked sausage (3) 0.1-0.5; scalded sausage (23) 0.6-16.5; non-ripened long-keeping-quality sausage (40) 0.2-15.2; ripened sausage (20) 0.06-8.2; cured backfat (9) 0.2-7.0; smoked meat products (19) 0.5-13.7; and canned meat products (36) 0.1-7.0. Results are presented in detail for various individual products within these groups. None of the samples studied exceeded current Yugoslavian tolerances for residual nitrite. The role of nitrite in nitrosamine formation is discussed, and the desirability of reducing residual nitrite concn. to the min. practical level is stressed. AJDW





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FAB 51

MEAT CANNING

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H. BROOKES  
EDITOR





1

[Heat resistance of enterococci.]

Reichart, O.; Deak, T.; Takacs, J.

*Konzerv-es Paprikaipar* No. 4, 134-140 (1979) [4 ref. Hu, de, ru]

The heat resistance of *Streptococcus faecalis*, *S. faecalis* var. *zymogenes*, *S. durans*, *S. faecium*, *S. bovis* and *S. liquefaciens*, isolated from canned ham, was examined in model experiments in a medium of 1.0 water activity. *S. durans* proved to be the most resistant at 70°C. ESK

2

[Relationship between amount of juice in canned stewed beef and the degree of autolysis of the raw materials.]

Bol'shakov, A. S.; Khakimdzhannov, A. B.; Lipatov, N. N.; Efimov, A. V.; Zabashta, A. G.

*Izvestiya Vysshikh Uchebnykh Zavedenii, Pishchevaya Tekhnologiya* No. 5, 88-90 (1980) [5 ref. Ru] [Moskovskii Tekh. Inst. Myasnoi i Molochnoi Promyshlennosti, Moscow, USSR]

The relation of juice release from beef during sterilization to the duration of post-mortem ageing of the meat was studied; it was found that juice release increases with increasing ageing time, max. juice release occurring with post-rigor meat. The dependence of juice release on ageing time is expressed mathematically; an equation is given permitting acceptably accurate detn. of released juice vol. for ageing times of 2-72 h at 0-4°C, with sterilization at 120°C. STI

3

[Characteristics and evaluation of the technological application of a thermo-bacteriological pasteurization test to canned meats. I. Decimal reduction times and coefficients of the pasteurization effect.] Charakteristik und Bewertung der technologischen Verwendbarkeit thermo-bakteriologischer Pasteurisierungstests von Fleischkonserven. I. Dezimale Reduktionszeiten und Koeffizienten der Pasteurisierungseffekte. Wojciechowski, J.

*Fleischwirtschaft* 60 (9) 1726-1731 (1980) [many ref. De, en] [Agric. Akad. Poznan, Wojska Polskiego 31, 60-624 Poznan, Poland]

The utilization of selected streptococci (*Streptococcus faecium* 1861 and *Str. faecalis* 509) as test strains for evaluating the pasteurization of canned meat was investigated. Results, shown graphically and in a table, revealed that decimal reduction times for *Str. faecium* 1861 in canned ham at 60° to 95°C were 2-5 min, and the coeff. of the pasteurization effect 42°C. Decimal reduction times of *Str. faecalis* 509 and *Str. faecium* 1861 in cured meat at 60° to 75°C were 55.3-23.5 and 64.9-28.8 min resp., with the greatest reduction between 60° and 70°C (55.3-31.2 and 64.9-37.8 min resp.). RM

4

[Characteristics and evaluation of the technological application of thermo-bacteriological pasteurization test to canned meats. II. Heat resistance characteristics of aerobic organisms, pasteurization value and critical points of semi-preserved products.] Charakteristik und Bewertung der technologischen Verwendbarkeit thermo-bakteriologischer Pasteurisierungstests von Fleischkonserven. II. Charakteristik der Hitzewiderstandsfähigkeit der Aerobier, Pasteurisierungswert und kritische Punkte von Halbkonserven. Wojciechowski, J.

*Fleischwirtschaft* 61 (3) 437-442 (1981) [many ref. De, en] [Agric. Akad. Poznan, Wojska Polskiego 31, 60-624 Poznan, Poland]

The heat resistance of aerobic organisms was compared with that of the test strains. It was found that between 65° and 80°C the time for heat destruction of aerobes in the raw material was linearly related to the temp., and could be used as a basis for determining the degree of their inactivation. The pasteurization value  $P = \text{approx. } 130 \text{ min (coeff. of pasteurization, } Z_p = 42^\circ\text{C, } T_r = \text{water temp. in the autoclave} = 72^\circ\text{C)}$  ensures sterilization of pasteurized canned products to about 1500 aerobes/g of product. The pasteurization values were used to determine the critical zones in rectangular and oval cans: this was shown to be a complicated problem, requiring separate detn. of the critical points for each size and shape of can. [See preceding abstr. for part I] AS

5

Processing and packaging of some Chinese style meat products.

Chang, P. Y.; Lai, C. S.; Lin, S. Y.; Li, C. F.

*Research Report, Food Industry Research and Development Institute* No. 3, 16pp. (1980) [7 ref. En] [Food Ind. Res. & Development Inst., Hsinchu, 300 Taiwan]

Suitable processing and packaging methods for commercial production of (i) stewed pork belly with fermented dry mustard greens, and (ii) stewed pork shank in sauce, were investigated. Tin cans were found to be the most suitable containers for (i) and (ii), as compared to half-size trays and retortable pouches, on the basis of ease of filling and sterilization, resistance to damage during handling, transport and storage, container cost, convenience of opening, and quality and shelflife of product. As long as the heat treatment had an  $F_0$  value of 6, no significant difference in various time/temp. combinations was noted for organoleptic quality (colour, flavour, texture) of the product, although HTST treatment was preferable, as overcooked flavour and less juicy texture was noted if the meat was heated at 121°C for > 80 min. Storage life, as measured by peroxide value, thiobarbituric acid value and flavour score was at least 5 months at 37°C. LH



## 6

[Effect of various factors on variations of nitrite content of meat.]

Djordjevic, V.; Vuksan, B.; Radetic, P.; Hak, D.; Mitkovic, M.

*Tehnologija Mesa* 21 (10) 287-290 (1980) [11 ref. Sh, en] [Jugoslovenski Inst. za Tehnologiju Mesa, Belgrade, Yugoslavia]

Samples of pork leg and other meats were comminuted and homogenized; the mass was then divided into 3 parts, which were adjusted to pH of 5.3, 5.8 or 6.3. The meat was held under refrigerated conditions for 24 h; 2% NaCl was then added, together with 10 or 20 mg NaNO<sub>2</sub> or NaNO<sub>3</sub>/100 g. The mixtures were then filled into cans, sealed, and sterilized at 120°C or pasteurized at 80°C. Contents of nitrate and nitrite were determined in the canned products after storage at 2-4°C for 6, 12 or 45 days. Results are presented diagrammatically. Residual nitrite concn. were higher in pasteurized than in sterilized samples; decomposition of nitrite increased with decreasing pH. Nitrate formation is proportional to added nitrite concn. STI

## 7

Bacteriology, water activity and moisture/salt ratio of six brands of precooked canned bacon.

Powers, E. M.; Berkowitz, D.; Walker, G. C.

*Journal of Food Protection* 44 (6) 447-449 (1981) [5 ref. En] [Food Sci. & Food Eng. Lab., US Army Natick Res. & Development Command, Natick, Massachusetts 01760, USA]

6 commercial brands of precooked canned bacon, comprising a total of 101 cans, were examined to determine if they complied with military specifications for a moisture-to-salt (M/S) ratio (% moisture divided by % salt) of  $\leq 9.0$ . Three brands were found in compliance with expected lot average values (ELAV) for M/S ratio of 4.70, 5.58 and 6.10. Water activity ELAV of samples from these 3 brands were 0.82, 0.89 and 0.91; aerobic plate counts (APC) ranged from  $< 100$  (64%) to 1500/g. Brands not in compliance had M/S ratio ELAV of 11.24, 12.00 and 12.83; water activity ELAV of 0.93, 0.97 and 0.99; and APC as high as  $1.7 \times 10^7$ /g. AS

## 8

Role of nitrates in the corrosion of tin plates processed food cans - A review. [Review]

Chakravorty, S. C.; Ghosh, B.

*Indian Food Packer* 35 (2) 70-75 (1981) [20 ref. En] [Metal Box India Ltd., Calcutta, West Bengal, India]

This review covers nitrate as detinner; mechanism of nitrate-induced detinning; factors affecting nitrate-induced detinning; and control of nitrate-induced detinning. CFTRI

## 9

[Dried skim-milk as a constituent of sausage and canned meats.]

Roseg, D.; Kampus, A.; Petrak, T.; Jelic, A.; Hraste, A. *Tehnologija Mesa* 21 (7/8) 204-208 (1980) [17 ref. Sh, en] [Vet. Fak., Zagreb, Yugoslavia]

Milk protein is important for emulsions to make liver paste, semi-perishable sausages, mortadella, frankfurters and chopped canned meat. The advantages of the enrichment are increase of protein contents, better emulsifying ability of fat, better consistency and appearance. In all cases dried skim milk was added at 1.5, 2, 3 and 4%. The products were analysed for contents of protein, fat, moisture and ash, colour, consistency and flavour. The results, presented in tabular form, clearly indicate the advantages of adding milk protein into the named meat products. STI

## 10

[Weight losses and organoleptic properties of beef pieces made with added brine containing soy protein isolate.]

Modic, R.; Milosevski, V.; Djukic, M.; Stojanovic, M.; Milanovic, R.

*Tehnologija Mesa* 21 (7/8) 224-226 (1980) [3 ref. Sh, en] [Jugoslovenski Inst. za Tehnologiju Mesa, Belgrade, Yugoslavia]

Beef pieces were injected with various quantities of brines (as used for manufacture of cured smoked pork products) containing NaNO<sub>2</sub>, polyphosphates and soy protein isolates. Effects on the organoleptic properties of canned beef in its own juice and beef goulash made with the treated beef pieces were evaluated. The beef was subjected to mechanical kneading after injection. Beef was found to easily absorb 30% brine. This treatment improved juiciness and softness of the beef; it had no effect on flavour. The process is recommended. STI

## 11

[Manufacture of combined ham containing soluble soy protein isolates.]

Modic, P.; Djordjevic, M.; Djurovic, M.; Car, V.

*Tehnologija Mesa* 21 (7/8) 213-215 (1980) [2 ref. Sh, en] [Jugoslovenski Inst. za Tehnologiju Mesa, Belgrade, Yugoslavia]

A process for manufacture of a canned 'combined' ham or pork shoulder product is described, based on injection of a brine containing nitrite, phosphate, glucose, sodium ascorbate and soy protein isolate. The brine is injected at a pressure of 200kPa; a total of 25.85% brine, containing 2.22% soluble protein, is injected. After injection, the meat is subjected to mechanical tumbling for 18 h. The remainder of the process is the same as for conventional ham. Taste and flavour of the product do not differ from those of conventionally-prepared products. STI



## 12

[Evaluation of the quality of canned liver sausage by subjective and objective criteria.] Bewertung der Qualität von Leberwurstkonserven nach subjektiven und objektiven Kriterien.

Sielaff, H.; Seidel, S.; Wölfel, S.

*Fleisch* 34 (11) 216-219 (1980) [2 ref. De] [Humboldt-Univ., Berlin]

Subjective evaluation of canned sausages was carried out using a 9-point system, levels 1-3 being unfit for sale, due to a burnt, bitter or caramelized taste. This was a measure of heat damage, browning or Maillard reactions beginning at 70°C, and producing intermediate reaction products. An objective measure of these reactions was achieved by making an aqueous extract of the product from its centre and peripheral zones. Extinction of the filtered extract was measured at 390 nm. The trials were carried out in a laboratory-scale autoclave at 115°C for 30 min, products subsequently being tested by taste panel and for browning reaction. Relationships between C-values (a measurement of heat sterilization intensity explained in the text), browning extinction values and sensory quality showed some correlation; C-value limits of  $\leq 50$  and  $\geq 154$  and extinction values of  $\leq 0.096$  and  $\geq 0.132$  were established. High C-value and browning extinction values were linked with inferior sensory ratings. Careful choice of process parameters and meat product thickness would enable heat damage to be reduced.

CS

## 13

[Hygiene problems in the manufacture of pasteurized canned meat products, and methods of resolving them.]

Kostenko, Yu. G.; Lyubashenko, S. Ya.; Stepanenko, P. P.; Shagova, T. S.

*Izvestiya Vysshikh Uchebnykh Zavedenii, Pishchevaya Tekhnologiya* No. 1, 21-22 (1981) [Ru] [Moskovskii Tekh. Inst. Myasnoi i Molochnoi Promyshlennosti, Moscow, USSR]

Hygiene requirements at various stages of manufacture of pasteurized canned meat products are described, including hygiene of raw materials and additives, the working environment, and handling of the finished products. STI

## 14

The determination of ascorbic and erythorbic acids in meat products.

Bunton, N. G.; Jennings, N.; Crosby, N. T.

*Journal of the Association of Public Analysts* 17 (3) 105-110 (1979) [5 ref. En] [Lab. of the Government Chem., Dep. of Ind., Cornwall House, Stamford Street, London SE1 9NQ, UK]

Methods for quantitative detn. of the antioxidants ascorbic acid and erythorbic acid in canned meat products were investigated. The total ascorbate present is first estimated by titration. The 2 individual isomers are then identified by TLC which also gives a semi-

quantitative estimate of the amount of each present. Finally, a quantitative procedure is described for each individual isomer. Levels of  $\geq 80$  mg/kg in canned meats can be detected by TLC whilst by the more sensitive fluorimetric procedure as little as 20 mg/kg can be measured. Some samples of imported meats were found to contain the non-permitted antioxidant, erythorbic acid. AS

## 15

Canned and packed prepared meat known as 'luncheon meat'.

Saudi Arabia, Saudi Arabia Standards Institution  
*Saudi Arabia Standard* SSA 160/1979, 4 + 5pp.  
(1979) [En + Ar]

The product shall be prepared from beef, mutton, goat and camel meats (but not pork products or their derivatives),  $\leq 3\%$  NaCl, 125 mg sodium or potassium nitrite/kg, and optional named ingredients. The product shall contain  $\geq 80\%$  meat,  $\leq 30\%$  total fats,  $\leq 55\%$  moisture, and  $\leq 5\%$  starch substances. Packaging, labelling and testing are also covered. AL

## 16

Canned corned beef and mutton meat.

Saudi Arabia, Saudi Arabia Standards Institution  
*Saudi Arabia Standard* SSA 137/1979, 4 + 4pp.  
(1979) [En + Ar]

Requirements for canned corned beef and mutton include that the product be prepared from chopped pre-cooked meat (with  $\leq 5\%$  chopped raw meat), NaCl,  $\leq 50$  mg sodium or potassium nitrite/kg, and optional named ingredients. The product shall contain  $\geq 21\%$  protein by wt., moisture content  $\leq 58\%$ , fat  $\leq 18\%$  and NaCl  $\leq 3.5\%$ . Packaging, labelling and testing are specified. AL

## 17

The effect of some meat proteins on the rheological properties of pectate and alginate gels.

Hughes, L.; Ledward, D. A.; Mitchell, J. R.; Summerlin, C.

*Journal of Texture Studies* 11 (3) 247-256 (1980) [8 ref. En] [Food Sci. Lab., Univ. of Nottingham, Sutton Bonington, Loughborough, UK]

The viscosity of 1% sodium alginate and 1% sodium pectate solutions containing low levels of  $\text{CaCl}_2$  were investigated using cone and plate viscometers. The level of Ca required to initiate partial gelation was significantly lower for pectate compared with alginate. With increasing  $\text{CaCl}_2$  concn. the solutions became more pseudoplastic and eventually showed thixotropy. 1% bovine serum albumin or 1% myoglobin was incorporated into the polysaccharide solutions together with sufficient Ca to cause incipient gelation in the

absence of the protein. Myoglobin inhibited the formation of an alginate gel, the effect being greatest at a pH of about 6.3. Bovine serum albumin also inhibited alginate formation, the effect increasing with increasing pH. In contrast the addition of both myoglobin and bovine serum albumin caused gel formation in the presence of pectate below pH 6.0. The results are



discussed in terms of the protein/polysaccharide interactions and the polymer/ion interactions that can take place in these systems. The relevance of this work to the use of these polysaccharides as thickeners and gelling agents in canned meat products is considered. AS

## 18

[Manufacture of canned sausage products.]

Herstellung von Wurstkonserven.

Winter, F. F.

*Fleischerei* 32 (10) 834-836 (1981) [1 ref. De]

Problems with achievement of a long shelf-life of meat products are discussed, with special reference to canned products. Aspects considered include microbial, chemical and enzymic spoilage, the importance of good hygienic quality of the raw material, and problems with thermophile spores in products cooled slowly after heat treatment. Recipes are given for various canned sausages and similar products. AJDW

## 19

[Changes in indices of lipid metabolism in rats receiving canned meat preparations intended for infant feeding.]

Petrovskii, K. S.; Khovaeva, L. A.; Terekhin, S. P.; Afanas'eva, N. A.

*Gigiena i Sanitariya* No. 10, 30-33 (1980) [5 ref. Ru, en] [Kafedra Gigeny Pitaniya, Moskovskii Med. Inst. imeni I.M. Sechenova, Moscow, USSR]

Groups of weanling rats received for 28 days 'Kroshka' canned homogenized meat preparations containing as stabilizers 1.5, 2.0 or 2.5% of (i) natural maize starch, (ii) modified phosphate maize starch, (iii) natural potato starch or (iv) modified gelling potato starch; a canned preparation without stabilizer served as control. Contents of total lipids, cholesterol, and  $\beta$ -lipoproteins were determined in blood serum, and total lipids, cholesterol and total N in livers of all groups of rats. It is concluded that (ii) and particularly (iv) stabilizers had an adverse effect on lipid metabolism in the young rats. In experiments with 'Malysh' canned preparations for children, effects were studied of replacements of part (1.5%) of the modified maize starch by 1.5% of 'Kazetsit', soy, sodium caseinate, coprecipitate, or dried whole or skim milk. Highest accumulation of lipids and correspondingly lower accumulation of protein in rat liver after 28 days resulted from inclusion of sodium caseinate. 'Kazetsit' had the least effect of the supplements. SKK

## 20

Canned meat in the Federal Republic of Germany. International Trade Centre UNCTAD/GATT

*Monographs on Trade Channels*

ITC/TD/SMR/60(63), 18pp. (1981) [En] [Palais des Nations, CH-1211 Geneva 10, Switzerland]

## 21

[Effects of pH reduction and some organic acids on the heat resistance of putrefactive anaerobic spores in the heating and culturing medium containing curing agents.]

Matsuda, N.; Matsumoto, N.; Ushizawa, S.; Kakegawa, Y.

*Canners' Journal [Kanzume Jiho]* 54 (7) 531-535 (1975) [3 ref. Ja, en] [Res. Lab. Canners Ass. Japan, Hodogaya-ku, Yokohama, Japan]

The D values of putrefactive anaerobic spores were markedly reduced by reduction of pH from 6.2 to 5.5. The reduced D value was affected by incubation period, increasing gradually with increased incubation time. It is necessary to have a long test period of > 12 months to confirm the shelf stability of canned, cured meat products. YY

## 22

[Detection of foreign protein in canned meat. I. Qualitative and quantitative analysis of soybean protein by disc electrophoresis.]

Ohhira, H.

*Canners' Journal [Kanzume Jiho]* 57 (11) 1034-1039 (1978) [5 ref. Ja, en] [Horinouchi Canning Co. Ltd., Res. Lab., 286 Horinouchi-cho, Kitauonuma-gun, Niigata, Japan]

Soybean protein, the foreign protein used most widely in canned meat, was examined by disc electrophoresis. Distinct differences between the electrophoretic patterns of meat protein and of soybean protein were observed. Addition of 2% soybean protein could be detected. The strength of the specific bands was approx. proportional to the soybean protein content. The soybean protein concn. in canned meat can be determined by means of a calibration curve with an error of 0.5-2%. YY

## 23

[Death of one child and severe poisoning of another after consumption of canned black pudding (Blutwurst) containing botulinus toxin formed by faulty manufacture and storage techniques.] Bildung von Botulinus-Toxin durch fehlerhafte Herstellung und Lagerung von Dosenblutwurst, deren Verzehr bei einem Kind zum Tode und bei einem anderen Kind zu schweren Vergiftungserscheinungen führten.

Coduro, E.

*Zeitschrift für das Gesamte Lebensmittelrecht (ZLR)* 8 (2) 165-173 (1981) [De]

## 24

[Changes in the inner surfaces of cans during long-term storage of canned meat containing various soy preparations.]

Illic, K.

*Tehnologija Mesa* 20 (12) 356-358 (1979) [11 ref. Sh, en] [Jugoslovenski Inst. za Tehnologiju Mesa, Belgrade, Yugoslavia]

Effect of (i) soy grits and (ii) soy protein isolate (Promine D) added to meat products on the inside surface of lacquered (epoxy phenol resin) and unlacquered tinplate cans was studied. During short-



term (48-h) storage, addition of soy grits caused high corrosivity, but Promine D did not significantly affect corrosion. After long-term (30-month, 3-yr) storage, changes in the canned meat products attributable to corrosion were similar in products both with and without the soy preparations. With unlacquered cans, corrosion was considerable with the (i) products, but less with the (ii) products, even after 48 h; corrosion was marked in all cases after long-term storage. With lacquered cans, for both (i) and (ii) corrosion was negligible or absent after 48 h, and still slight after 7 yr. STI

## 25

[Degree and significance of variation between factories of pork in its own juice made in accordance with the terms of a contract.] Ausmass und Bedeutung der zwischen-betrieblichen Streuung bei einem im Werkvertrag hergestellten Schweinefleisch im eigenen Saft.

Hildebrandt, G.; Meister, R.; Benner, M.; Schneider, W.; Konopka, G.

*Fleischwirtschaft* 61 (10) 1469, 1470, 1472, 1474, 1476-1477; 1551 (1981) [many ref. De, en]

Pork in its own juice was used to study the problems involved in the production of standard products of uniform fat content by several manufacturers, by observing standards for sample analysis, recipe, technology and yield. In spite of extensive control, only 3 out of 6 manufacturers produced completely standard canned products. The other firms showed considerable deviations between days or very high variations within one day. A continuous quality testing system by means of control cards is suggested, to detect short-term deviations and long-term trends, including calculation of the proportion of 'reject' samples. RM

## 26

**Maltol treated canned meat process.**

Jones, D. L.; Conant, F. R. (William Underwood Co.)  
*United States Patent* 4 279 936 (1981) [En]

The colour in canned cured meat products is preserved without using nitrates or nitrites by curing the meat, e.g. ham, with a pickling brine followed by the addition of maltol prior to sterilization. RAW

## 27

[Using film-packed, pressed, cooked beef for manufacture of canned goulash?] In Schlauchfolie gepresstes, gegartes Rindfleisch zur Herstellung von Gulaschkonserven?

Flemmig, R.

*Fleischwirtschaft* 61 (9) 1248, 1250 (1981) [3 ref. De]  
[Staatliches Veterinäruntersuchungsamt Giessen, Marburger Strasse 54, D-6300 Giessen, Federal Republic of Germany]

The production of canned goulash from imported film-packed cooked beef is discussed. Examinations showed that products made from 'industrial grade' beef differed in structure and consistency from traditionally-made goulash; those from 'standard grade' beef were comparable to the traditionally made product. It is suggested that the standard grade be admitted without special label disclosure. RM

## 28

[Storage of meat preserves in aluminium cans.]

Oreshkin, E. F.; Barmash, A. T.; Marchenko, A. P.; Klimova, N. I.; Neeshkhlebov, A. I.

*Myasnaya Industriya SSSR* No. 11, 13-15 (1980) [4 ref. Ru] [Vses. Nauchno-issled. Inst. Myasnoi Promyshlennosti, Moscow, USSR]

Pressed Al cans (353 ml), made from AMr-2 alloy with an epoxy/phenol lacquer and subsequently sterilized at 0.21-0.22 MPa pressure in stationary vertical autoclaves at 120°C, were used to package meat preserves (beef, pork, lamb, goulash, sausage, minced offal and buckwheat gruel with beef). The cans were then kept for 2.5 yr in normal, heated storage space; at 6-month intervals samples were opened and inspected visually, and physical, chemical (including Al concn.) and organoleptic properties of the preserves were evaluated. For all products the Al content increased with increasing storage time, but remained well within permitted limits. All the products were still sterile, but those made from meat that had been thawed or having a high pH (pork, lamb, minced offal) were unsatisfactory organoleptically. The cans were perfectly suitable for the other products. STI

## 29

[Modelling and algorithm development for quality control of meat products.] [Lecture]

Ivashkin, Yu. A.; Protopopov, I. I.; Kostenko, Yu. G.; Oreshkin, E. F.; Prizenko, V. K.

*Proceedings of the European Meeting of Meat Research Workers* No. 26, Vol. II, L-18, pp. 174-176 (1980) [Ru] [Moskovskii Tekh. Inst. Myasnoi i Molochnoi Promyshlennosti, Moscow, USSR]

Mathematical formulae are presented on the relation between processing parameters and quality of canned meat delicacies, the parameters including water-holding capacity of the raw material, curing time and % gel added to the canned product. Computer modelling from an algorithm of the results can be used to determine optimal parameters for individual processing stages, ensuring high final product quality. [See FSTA (1982) 14 8S1379.] RAW

## 30

[Microbiological quality of meat products and raw materials. IV. Semi-preserved products.] [Lecture]

Catsaras, M.; Grebot, D.

*Proceedings of the European Meeting of Meat Research Workers* No. 26, Vol. II, N-21, pp. 328-330 (1980) [Fr] [Cent. d'Enseignement & de Recherche de Bacteriol. des Aliments, Inst. Pasteur, Lille, France]

Studies were conducted on the microbiological quality of semi-preserved canned ham, 50 samples being tested. Results are presented. *Salmonella* were not detectable in 25-g samples from any of the hams. *Staphylococcus aureus*, *Escherichia coli* and sulphite-reducing anaerobes were not detectable in a 1-g sample of any of the hams. Coliform counts were  $\leq 10^6$ /g in all samples. Aerobic mesophile counts were  $10^5$ - $10^7$ /g in 49 hams,  $5 \times 10^4$  in 1 ham. Group D streptococci were absent, or present at counts  $< 10^2$ /g in 47 samples, but present at  $10^3$ /g in 3. No spores of sulphite-reducing clostridia were present in any sample. Total volatile basic N concn. ranged from 10 to 30 mg/100 g. Results are discussed in relation to raw material quality and French standards. [See preceding abstr. for part III.] [See FSTA (1982) 14 8S1379.] AJDW



## 31

The microbiological safety of canned, cured, perishable meat products. [Lecture]

Johnston, R. W.; Krumm, G. W.

*Proceedings of the European Meeting of Meat Research Workers* No. 26, Vol. II, N-12, pp. 295-299 (1980) [13 ref. En] [USDA, Food Safety & Quality Service, Washington, DC, USA]

Potential health hazard from pasteurized canned hams and similar products, exposed to temp. abuse during storage and distribution, is discussed with special reference to *Clostridium botulinum*. Data for brine concn. in imported and US domestic hams over the period 1973-1977 are presented. Average brine % was slightly higher in imported than domestic hams. For both, large numbers had brine % lower than the desirable level of 3.5%, and some were below 1.2%. As nitrite concn. is generally closely related to brine concn., some canned hams would have little or no anticrostridial activity, presenting a health hazard if not refrigerated throughout distribution. Various cases of spoilage of pasteurized canned hams in the USA are discussed. It is concluded that the preservative effect of salt and nitrite may not be as effective as commonly believed, because of variation in concn. of these additives in the product, and loss of nitrite during storage. [See FSTA (1982) 14 8S1379.] AJDW

## 32

Effect of sulfur dioxide on *C. botulinum* in cooked meat. [Lecture]

Tompkin, R. B.; Christiansen, L. N.; Shaparis, A. B.

*Proceedings of the European Meeting of Meat Research Workers* No. 26, Vol. II, M-11, pp. 248-249 (1980) [6 ref. En] [Swift & Co., 1919 Swift Drive, Oak Brook, Illinois 60521, USA]

A canned comminuted pork product was prepared with 50, 100 or 200 µg SO<sub>2</sub>/g, or 200 µg SO<sub>2</sub> + 40 µg NaNO<sub>2</sub>/g, inoculated with a heat shocked culture of 5 *Clostridium botulinum* type A and 5 type B strains, canned, stored at 4.4°C for 0, 10 or 26 wk, and incubated at 27°C. Swelled cans were tested for *Cl. botulinum* toxin. 200 µg SO<sub>2</sub>/g gave considerable inhibition of *Cl. botulinum* toxin formation; lower SO<sub>2</sub> concn. were much less effective. Addition of 40 µg NaNO<sub>2</sub>/g considerably reduced the inhibitory activity of 200 µg SO<sub>2</sub>/g. Holding at 4.4°C also reduced the inhibitory activity of SO<sub>2</sub>, although considerable inhibitory activity remained after 26 wk. Variability of inhibitory activity is also discussed. [See FSTA (1982) 14 8S1379.] AJDW

## 33

Tracing of the changes in volatile monocarbonyls and lipid oxidation products in pork during the manufacture of canned ham. [Lecture]

Nestorov, N.; Gadzheva, D.; Baychev, I.; Gateva, A.

*Proceedings of the European Meeting of Meat Research Workers* No. 26, Vol. II, L-23, pp. 192-195 (1980) [17 ref. En] [Meat Tech. Res. Inst., Sofia, Bulgaria]

Studies were conducted on volatile monocarbonyls and lipid oxidation products in 'Rousse' canned ham at 4 stages of processing: (i) raw meat, (ii) cured meat, (iii) pasteurized product and (iv) sterilized product.

Monocarbonyl concn. were higher in lean than in adipose tissue at all stages of processing, and increased in concn. from (i) to (iv). The ketone fraction of monocarbonyls was present at higher concn. and was more variable than the aldehyde fraction. Unsaturated carbonyls concn. increased as a result of heat treatment. All indices of lipid oxidation increased from (i) to (iv), the increase attributable to (iii) or (iv) being especially marked. [See FSTA (1982) 14 8S1379.] AJDW

## 34

Heating rate of canned cured PSE and DFD pork. [Lecture]

Radetic, P.; Suvakov, M.; Panin, J.

*Proceedings of the European Meeting of Meat Research Workers* No. 26, Vol. II, L-22, pp. 188-191 (1980) [23 ref. En] [Yugoslav Inst. of Meat Tech., Belgrade, Yugoslavia]

Samples of pale soft exudative (PSE) and dark firm dry (DFD) pork *semimembranosus* muscle were comminuted, and used to prepare meat mixes containing 4.0% NaCl, 0.5% polyphosphate and 0, 15 or 30% added water. The mixes were filled into round cans (73 mm diam., 74 mm high), and heated in a water bath at 80°C, to a core temp. of 70°C. Heating rate was determined, and water-holding capacity was evaluated before and after heat treatment. Water holding capacity was higher for DFD than for PSE meat mixes. The mixes with the highest added water content also had the highest water-binding capacity. This effect was more marked for PSE than for DFD mixes. This phenomenon is considered in relation to the ratio of added NaCl and polyphosphate to muscle protein concn. DFD mixes had slower heating rates than PSE mixes; there was a tendency for heating rate to increase with increasing added water content, this being especially noticeable with DFD mixes. [See FSTA (1982) 14 8S1379.] AJDW

## 35

[Control of can seals in the meat canning factory at Papa.]

Vakany, E.

*Konzerv- es Paprikaipar* No. 4, 145-148 (1981) [Hu, de, ru] [MEM Elelmiszeripari Higieniar Ellenorzo Szolgalata, Budapest, Hungary]

## 36

[Studies of cooking losses occurring during sterilisation of tinned meat.] Untersuchungen über den Kochverlust beim Sterilisieren von Fleischvollkonserven.

Psota, A.; Hasitschka, P.; Nowak, H.; Herr, E.; Denkmayer, A.

*Ernährung* 6 (3) 126-129 (1982) [De]

[Lebensmitteluntersuchungsanstalt, Viehmarktgassee 1, A-1030 Vienna, Austria]

Trials were performed to assess the cooking losses of tinned meat products based on (i) beef, (ii) veal, (iii) pork and (iv) venison. For (i) 3 different beef cuts were cubed, and 2 sample groups taken from each cut: the meat was coated either with brine or beef goulash gravy and packed in light Al trays. For (ii), mixed meat samples were similarly grouped, a veal goulash gravy replacing the beef gravy. (iii) samples were coated either with



brine or sauerkraut + gravy, and (iv) samples were only coated with venison ragout sauce. All tinned meats were autoclaved, and raw samples of (i)–(iv) were chemically analysed; results are given for chemical analysis of the meats and gravies/sauces, and % cooking losses, with corresponding protein and collagen losses. Average percentual cooking losses for meats cooked in brine and sauce/gravy were resp. in (i), 29.6 and 42.8 in Schwarzes Scherzl meat, 23.6 and 37.3 in boneless forequarter, and 12.6 and 27.3 in shin meat; in (ii), 21.6 and 32.3; in (iii), 23.4 and 41.7; and (iv) 21.7 (in ragout sauce). Water losses comprised the main loss, resulting in concn. of protein in the meat and considerable transfer of protein into the cooking liquid. RAW

### 37

#### Proteolytic activities of tinned meat products.

Kas, J.; Rauch, P.; Demnerova, K.; Sebesta, J.  
*Zeitschrift für Lebensmittel-Untersuchung und -Forschung* 174 (4) 271–273 (1982) [6 ref. En, de] [Dep. of Biochem. & Microbiol., Inst. of Chem. Tech., 16628 Prague, Czechoslovakia]

Proteolytic activity in canned meat products was determined at pH 6 using gently denatured human serum albumin labelled with  $^{125}\text{I}$ . Results are expressed as liberated radioactivity, or in some cases recalculated as  $\mu\text{g}$  tyrosine released/g product. Preliminary studies of meat products showed that canned beef had high levels of proteolytic activity, and that this activity was localized in the meat portion of can contents, not in fat, sauce or jelly. Because of variation of activity in different parts of a can, the entire meat portion of a can must be homogenized before sampling. Studies of canned beef from 2 factories, 1 with better sanitation levels and processing conditions than the other, showed that the factory with better processing conditions produced beef with lower proteolytic activity. Proteolytic activity was assumed to result from thermostable enzymes produced by contaminating microorganisms before sterilization. This view was supported by studies on beef intentionally contaminated with *Pseudomonas* and *Bacillus* strains prior to sterilization. Sterilized uncontaminated beef had no proteolytic activity; sterilized previously contaminated beef possessed proteolytic activity. Storage of canned beef for 2 and 4 yr showed that older samples had higher proteolytic activity than newer ones. DIH

### 38

[Hygienic slaughtering and meat handling methods used in canned pork production of the Meat Plant, Papa.]

Or, T.

*Konzerv- es Paprikaipar* No. 3, 96–100 (1980) [Hu, de, en] [MEM EHESZ Husipari Kirendeltesege, Papa, Hungary]

As a result of elaborate hygienic conditions secured in the plant by special slaughtering and meat handling technology, described in detail, the total microbiological counts of boned and brined pork were always  $< 1000/\text{g}$ . Annual production of the plant is about 10 000 t canned meat. ESK

### 39

Technological, chemical and microbiological studies on canned luncheon.

El-Shazeli, M. G.; El-Zalaki, E. M.; Mohamed, M. S.; Aman, M. B.

*Alexandria Journal of Agricultural Research* 28 (3) 125–130 (1980) [7 ref. En, ar] [Food Sci. & Tech. Dep. Univ. of Alexandria, Egypt]

Chemical studies were carried out on samples of canned luncheon meat imported into Egypt. These studies were followed by experimental formulation of luncheon meat recipes and assessment of their quality. The recipes contained, in addition to beef, chickpea flour and/or tahena (sesame seed butter). Glycerol monostearate and tomato juice were incorporated to improve texture and colour of the products. Results showed that the formulated products were acceptable organoleptically, contained balanced amounts of protein, fat and carbohydrate, legal levels of nitrites and were safe from the microbiological point of view. AS

### 40

The potential of peapods as food thickeners.

Taylor, A. J.; Pritchard, S.

*Journal of the Science of Food and Agriculture* 33 (4) 384–388 (1982) [8 ref. En] [Dep. of Applied Biochem. & Food Sci., Univ. of Nottingham, Sutton Bonington, Loughborough, Leicestershire LE12 5RD, UK]

Peapods were de-esterified to give a crude powder which contained low-methoxyl pectin. Analysis showed that the degree of esterification was reduced substantially from around 60% to about 10%. When this powder was incorporated into a canned minced-beef product in the presence of calcium ions, a gelled product resulted and the degree of gelling was dependent on the amount of powder added. Results from a taste panel indicated that the taste of the peapod thickener was acceptable. AS

### 41

[Manufacture of small sausages, including canned products.] Herstellung von Würstchen, auch in der Dose.

Winter, F. F.

*Fleischerei* 33 (2) 81–82 (1982) [2 ref. De]

Manufacture of Würstchen (small sausages) is discussed, with reference to: historical aspects; recipes; smoking; canning; sterilization; and manufacture of 'cocktail sausages'. AJDW

### 42

[The influence of technological additives on the breakdown of protein and quantitative changes of essential amino acids in meat products.] Einfluss technologischer Zusätze auf die Desaggregation des Eiweisses und die Mengenveränderungen der essentiellen Aminosäuren in Fleischkonserven.

Janitz, W.

*Fleischwirtschaft* 61 (9) 1385–1388 (1981) [24 ref. De, en] [Inst. for Nutr. Res., Agric. Univ., Mazowiecka 48, 60-623 Poznan, Poland]

The effects of technological additives (curing salt with phosphate, a cold smoking preparation, and potato starch) on protein breakdown was investigated in 24 canned meat products made from freshly



slaughtered meat, partly autolysed meat (after 1 wk at 4°C) and thawed frozen meat (6 wk at -18°C, 12 h thawing at 15°C). Tabulated results showed that curing freshly slaughtered meat reduced the breakdown of peptides to free amino acids and hydrolysis of collagen, while the opposite effects were observed in partly autolysed and thawed frozen meat. Addition of starch increased the amount of soluble collagen in freshly slaughtered meat. The fat content of the meat only affected autolysed and thawed frozen meat, reducing amino-N by about 16% and soluble collagen by 20%.

The breakdown of essential amino acids (especially methionine) was enhanced by fat but inhibited by starch. The changes are interpreted in terms of protein structure and denaturation. RM

#### 43

[Evaluation of the shelf-life test in canned luncheon meat.]

Havas, F.

*Magyar Allatorvosok Lapja* 37 (4) 235 (1982) [Hu]

[MEM Elelmiszerhigiéniai Ellenőrző Szolgálat, Budapest, Hungary]

Experiments with canned luncheon meat artificially contaminated with *Clostridium sporogenes* PA 3679 showed that a heat treatment of 5.0-6.0 Fs and > 4.0 Fc is satisfactory, provided the product is prepared from first class raw materials under strict hygienic and technological conditions. ESK

#### 44

[Effect of thermal processing on the sensory quality of luncheon meat.]

Song, I. S.; Kang, T. S.; Kim, K. S.; Suh, K. B.; Song, K. W.

*Korean Journal of Animal Science [Hanguk Ch'uksan Hakhoe Chi]* 24 (2) 127-133 (1982) [20 ref. Ko, en]

Luncheon meat (70% pork lean, 30% pork fat) was canned and processed at 115°, 121° or 127°C for various times, to reach cooking values of 120, 160 or 200 (F<sub>0</sub> values are quoted for these time/temp. combinations).

Sensory quality of the product (colour, flavour, texture) was reduced by higher temp., even at the same C-values, and by the use of higher C-values. [From En summ.] LH

#### 45

Chemical composition of meat and sensory quality of canned meat and frozen meat from harp seal (*Phoca groenlandica*) in molting and pre-molting condition.

Botta, J. R.; Arsenault, E.; Ryan, H. A.; Shouse, N.

*Canadian Technical Report of Fisheries and Aquatic Sciences* No. 1053, iv + 18pp. (1982) [8 ref. En, fr]

[Dep. of Fisheries & Oceans, PO Box 5667, St John's, Newfoundland A1C 5X1, Canada]

A laboratory study was carried out to investigate the suitability for human consumption of meat from harp seal in molting condition, i.e. in early April for 4-6 wk when they shed their hair, reduce feeding substantially

and hence lose up to 20% of their blubber, and in general appear of inferior quality compared to animals caught during Feb. and March. Different carcass cuts of meat (flank, flipper, rump) from molting and pre-molting seals of different ages (1, 2, 3 and ≥ 4 yr) were analysed chemically and organoleptically and data were subjected to statistical analysis; tables of data are given. Portions of each cut were (i) canned plain without seasoning, (ii) canned with onions and salt added, or (iii) frozen prior to cooking. Contents of ash, fat and protein from molting and pre-molting seals were not significantly different, but the latter had significantly lower moisture content and higher carbohydrate content. Regardless of processing method, the sensory panel preferred meat from molting seals, with the greatest effect being with (i) meat and the least effect with (iii) meat. Age of seal and type of carcass cut influenced the sensory quality of the meat. AL

#### 46

[Determination of the pasteurization value.]

Bestimmung des Pasteurisationswertes.

Harabasz, J. S.; Ziemkowski, M.; Wojciechowski, J.

*Fleischwirtschaft* 62 (5) 644-647 (1982) [3 ref. De, en]

[Dep. for Mathematical & Statistical Methods, Agric. Acad., 60-637 Poznan, Poland]

A method is described for detn. of the pasteurization value (P value) in canned meats cooked by heat conduction. It is assumed that the speed of temp. rise is proportional to the actual temp. difference between the heating plant and the centre of the can. Functions describing the temp. at the geometric centre of the can as a function of time are described separately for the heating and cooling phase. P-value tables can be worked out from these functions. The P-value of any pasteurization process can be determined from the tables on the basis of 3 known points on the temp. curve. In calculating the tables it was assumed that significant pasteurization effects can be achieved at temp. > 50°C, and that the coeff. of thermal resistance of heat-resistant vegetative forms of bacteria is 42°C. AS

#### 47

[Corned beef.] Corned beef.

Müller, -.

*Fleischwirtschaft* 62 (5) 544-545 (1982) [De]

[Bundesanstalt für Fleischforschung, 8650 Kulmbach, Federal Republic of Germany]

In answer to a reader's question, the author gives instructions on the manufacture and canning of corned beef. Literature is available on request. RM

#### 48

[Toxic metals in raw materials and products of the meat industry.]

Dordevic, D.; Milohnoja, M.; Dujic, I.; Radovic, N.

*Tehnologija Mesa* 22 (11) 312-315 (1981) [15 ref. Sh, en] [Jugoslovenski Inst. Tehnologiju Mesa, Belgrade, Yugoslavia]

Muscle, fatty tissue, kidneys and liver of cattle and

pigs, and canned hams and pork shoulders, were analysed for As, Sb, Cd, Hg, Pb and Se. Data are given for the proportions of samples in which heavy metals were found, and for mean and max. concn. detected (with s.d. and coeff. of variation). Levels of heavy metals in the canned products were within tolerance limits. 13 additives commonly used in meat processing were also analysed. STI

## 49

[Evaluating the incubation test for canned luncheon meat.] Untersuchungen zur Auswertung der Inkubationsprobe bei Luncheon Meat-Konserven. Havas, F.; Takacs, J.

*Fleischwirtschaft* 62 (5) 634-636 (1982) [9 ref. De, en]  
[Hygiene Control Service, Agric. and Food Min., Budapest, Hungary]

Luncheon meat manufactured exclusively from pork was made with 1% nitrite curing salt (0.4%  $\text{NaNO}_2$  content) and 1% common salt. The mixture was infected with spores of *Clostridium sporogenes* PA 3679 at  $10^5$  to  $7 \times 10^7$  spores/g. Cans were sterilized in a standing autoclave at  $F_0$ -values of 0.969971, 1.428523, 2.755458 and 2.769727. Thermo-electric measurements in the homogenous mixture were taken at the geometrical centre of a container. Controls were manufactured in the same way but without nitrite curing salt or common salt. After heat treatment, cans were incubated at 37°C for 30 days. Once an  $F_0$ -value of  $\geq 1.428523$  had been reached, no *C. sporogenes* were detected. In products prepared with nitrite curing salt, no *C. sporogenes* spores were detected after reaching an  $F_0$  of 0.969971. Results suggest that incubation tests are not necessary for canned luncheon meat manufactured under good hygienic conditions with uncontaminated raw material and by the correct technology, including heat treatment at an  $F_0$ -value of 5.0-6.0 [From En summ.] RM





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